General Pharmacology
Pharmacokinetics

1. Which of the following statements is correct?
   1. Drugs showing a large VD can be efficiently removed by dialysis of the plasma.
   2. **Stressful emotions can lead to a slowing of drug absorption.**
   3. If the VD for a drug is small, most of the drug is in the extraplasmic space.
   4. Weak bases are absorbed efficiently across the epithelial cells of the stomach.

2. Which of the following statements is correct?
   1. Coadministration of atropine which slows gastric emptying speeds the absorption of a second drug.
   2. The addition of glucoronic acid to a drug occurs at the same rate in adults and newborns.
   3. **Active transport of drugs by special carrier molecules occurs if the drugs are structurally related to endogenous molecules, such as amino acids or sugars.**
   4. Passive diffusion across lipid membranes requires some degree of water solubility.

3. Which of the following is true for a drug whose elimination from plasma shows first-order kinetics?
   1. The amount eliminated per unit of time is constant.
   2. The half-life of the drug is proportional to the drug concentration in plasma.
   3. A plot of drug concentration versus time is a straight line.
   4. **The rate of elimination is proportional to the plasma concentration.**

4. Which of the following statements is correct?
   1. **The addition of glucoronic acid to a drug is an example of a phase II reaction.**
   2. Drugs showing zero-order kinetics of elimination are more common than those showing first-order kinetics.
   3. If the first-order kinetics drugs elimination involves a rate-limiting enzymic reaction operating at its maximal velocity (Vm).
   4. The addition of glucoronic acid to a drug involves cytochrome P-450.

5. A patient is treated with drug "A", which has a high affinity to albumin and is administered in amounts that do not exceed the binding capacity of albumin. The second drug "B" is added to the treatment regimen. The "B" drug also has high affinity for albumin, but is administered in amounts, that are 100 times more than the binding capacity of albumin. Which of the following occurs after administration of the drug "B"?
   1. A decrease in the tissue concentration of drug "A".
   2. **An increase in the tissue concentrations of drug "A".**
   3. A decrease in the volume of distribution of drug "A".
   4. A decrease in the half-life of drug 'B".

6. Which of the following results in a doubling of the steady-state concentration of a drug?
   1. Doubling the rate of infusion and doubling the concentration of the infused drug.
   2. **Doubling the rate of infusion.**
   3. Maintaining the rate of infusion, but doubling the loading dose.
   4. Tripling the rate of infusion.

7. Drugs showing zero-order kinetics of elimination:
   1. Show a constant fraction of the drug eliminated per unit time.
   2. **Show a plot of drug concentration versus time that is linear**
   3. Decrease in concentration exponentially with time.
   4. Have a half-life independent of dose.

8. A drug given as a 100 mg single dose, results I a peak plasma concentration of 20 mcg/ml. The apparent volume of distribution is (assume a rapid distribution and negligible elimination prior to measuring the peak plasma level):
    1. 10L
    2. **5L**
    3. 2L
    4. 1L.

9. A drug with a half-life of 12 hours is administered by continuous iv infusion. How long will it take the drug to reach ninety percent of its final steady-state level?
    1. 90 hours
    2. **40 hours**
    3. 30 hours
    4. 24 hours.

10. The following statements describe pharmacokinetic concepts:
    1. **Only the unionized drug fraction may cross intact cell membranes**.
    2. Drug metabolites invariably lack pharmacological effects.
    3. All drug metabolism takes place in the liver.
    4. All drugs must first be metabolized before they can be excreted.

11. The following drugs undergo to zero-order kinetics of elimination, except:
    1. Phenytoin
    2. Ethanol (alcohol)
    3. Aspirin
    4. **Atropine**

12. Choose the correct answer:
    1. Drug metabolism involves phase I reactions such as conjugation of a polar group (sulfate, acetate and glucuronate) to the drug molecule.
    2. Phase II pathway involve oxidation, hydrolysis and reduction.
    3. **The most important members of CYP 450 family involving in drug metabolism are: 1A2, 2C9, 2D6 and 3A4.**
    4. The addition of glucoronic acid to a drug is an example of a phase I reaction.

13. Choose the correct answer:
    1. Weak bases are predictably better absorbed from the stomach
    2. Weak acids might be expected to be absorbed from the small bowel.
    3. **If given orally, the rate of absorption of most drugs is greatly influenced by the rate of gastric emptying.**
    4. Ionized (polar) drugs cross membranes readily than the unionized (no polar) drugs.
14. Choose the correct answer:
    1. Organ blood flow is not principal determinant of drugs tissues distribution.
    2. **A highly lipophilic drug crosses membranes readily even in the presence of tight junctions between endothelial cells.**
    3. Acidic drugs mainly bind to the acid glycoprotein, while basic drugs bind more avidly to albumin
    4. First pass metabolism does not influence on drugs bioavailability.

15. Choose the correct answer:
    1. **A value of VD<5L implies that the drug is retained within the vascular compartment.**
    2. A value of VD>15L suggests that the drug is restricted to the extra-cellular fluid.
    3. A drug achieves 75% of its steady-state concentration after three half-lives.

4. Sublingual and rectal administration of drugs is associated with high degree of first-pass metabolism.

16. Choose the correct answer:
    1. **When PH is less than pKa the protonated forms of the weak acids and weak bases predominates.**
    2. When PH is less than pKa the deprotonated forms of the weak acids and weak bases predominates.
    3. The relationship of pKa and the ratio of acid-base concentrations to PH is expressed by the Michaelis-Menten equation.
    4. Extremely hydrophobic drugs are well absorbed.

17. Choose the correct answer:
    1. **When PH is greater than pKa the deprotonated forms of weak acids and weak bases predominate**.
    2. The phase I reactions of drug metabolism always precede phase II reactions.
    3. The metabolites of the drugs are always less active than the parent drugs.
    4. Uncharged lipophilic drugs are more easily excreted.

18. The following drugs can increase the rate of synthesis of CYP-450 enzymes, except:
    1. Rifampicin (antituberculosis drug)
    2. Phenytoin (antiepileptic drug)
    3. Phenobarbital (hypnotic drug)
    4. **Cimetidine (antiulcer drug)**

19. The following drugs inhibit CYP-450 enzymes, except:
    1. Erythromycin (antibiotic)
    2. Ciprofloxacin (antibacterial)
    3. Cimetidine (antiulcer drug)
    4. **Phenobarbital (hypnotic drug)**

20. Which of the following statements is correct?
    1. **The first-pass metabolism, it is a term that does not refer only to hepatic metabolism.**
    2. Hydrophilic drug readily diffuses back from the renal tubule into the blood than lipophilic drugs.
    3. Lipophilic drugs are more easily excreted by the kidneys.
    4. In the elderly, hepatic metabolism of drugs may be reduced and it is more important than declining renal function.

21. Choose the correct answer:
    1. **The stored drugs may have VD greater than total body water (e.g. lipid soluble drugs).**
    2. The less the VD, the slower elimination rate.
    3. Drugs, bound to plasma proteins are readily filtered.
    4. The greater the VD, the more rapid is the elimination rate.

22. Which of the following statements is correct?
    1. Zero-order kinetics – when the absorption or excretion of a drug is concentration-depended and not-saturable.
    2. **Zero-order kinetics – when the elimination process is saturated and a constant amount (not fraction) of the drug is eliminated over a given time period.**
    3. First-order kinetics, when the elimination process is saturated and a constant amount of the drug is eliminated over a given time period.
    4. Aspirin, ethanol and fenitoin usually undergo to first-order kinetics.

23. Choose the correct answer:
    1. Tubular secretion is usually a passive process

2. **Tubular secretion is usually an active process, saturable, mostly in proximal convoluted tubule**
3. Passive excretion – charged particles cannot passively cross tubular membranes.
4. Acidification is used in salicylic acid poisoning to increase excretion.

24. Choose the correct answer:
    1. **If a drug is in a lipid-soluble form during its passage down the renal tubule, a significant fraction will b reabsorbed by simple passive diffusion.**
    2. Weak bases are usually excreted faster in alkaline urine.
    3. Weak acids are usually excreted faster in acidic urine.
    4. Sweat, saliva, tears and breast milk contribute maximally to excretion of drugs.

25. Choose the correct answer:
    1. Conjugation is related to phase I of drug metabolism.
    2. **Prodrugs are inactive until they are metabolized in the body to the active drug.**
    3. Paracetamol, a widely used weak analgesic, normally undergoes oxidation.
    4. Drug elimination is almost complete after 3 half-lives.

26. Choose the correct answer:
    1. **Clearance (Cl) of drug from the body is equal to the product of the rate constant (Ke) and volume of distribution; Cl=(Ke) (VD).**
    2. Serum creatinine and blood urea nitrogen correlate well with elimination of a drug by the kidney than creatinine clearance.
    3. Passive distribution of drug requires special carrier molecules.
    4. Facilitated diffusion is selective, saturable, inhibitable and requires energy expenditure.

27. Choose the correct answer:
    1. P-glycoprotein or multidrug resistance type 1 transporter transports many xenobiotics into the cell.
    2. the ratio of lipid-soluble form to water-soluble form for a weak acid or weak base is expressed by the Fick's law equation for diffusion.
    3. The unprotonated form of a weak acid is the neutral and more lipid-soluble.
    4. **Uncharged form is more lipid-soluble.**

28. Choose the correct answer:
    1. **Weak acids are usually excreted faster in alkaline urine, while weak-bases – in acidic urine.**
    2. Drug concentration in systemic circulation is pharmacodynamics.
    3. Clearance has real meaning for drugs with capacity-limited elimination (known as saturable, Michaelis-Menten elimination).
    4. The equation:
        a. V=drug metabolism rate $=V_{max}[C]/[C] = V_{max}$
        b. (where V_{max} is maximal velocity and C – drug concentration)
        c. is associated with first-order kinetics.

29. Choose the correct answer:
    1. Pharmacokinetics describes the detailed actions of drugs on living systems.
    2. Pharmacodynamics describes the actions of biologic systems on drugs.
    3. Absorption, distribution and elimination of drugs are the phramacodynamic parameters.
    4. **If the drugs are structurally related to endogenous molecules such as amino acids or sugars, they undergo to active transport by special carrier molecules.**

30. Choose the correct answer:
    Some very large or very polar drugs (vitamin B_{12}, iron) are complexed with proteins and actively transported into cells by:

1. Passive diffusion
2. **Endocytosis**
3. Facilitated diffusion
4. P-glycoprotein

31. Choose the correct answer:
    1. The equation: rate of elimination = CLxC is usually referred to as zero-order elimination.
    2. **Clearance can be calculated from the dose divided by the AUC (area under curve) of the time-concentration profile after a dose which is usually referred to as first-order elimination.**
    3. For a drug taken once every half-live the accumulation factor is 4.
    4. Accumulation is directly proportional to the fraction of the dose lost in each dosing interval.

32. Choose the correct answer:
    1. Half-life is inversely proportional to VD.
    2. **Phase I reactions utilizing the CYP 450 system.**
    3. Glucuronidation, sulfation and methylation are phase I reactions of drug metabolism.
    4. Charged molecules can easily back-diffuse out of the kidney lumen.

33. Which of the following statements is correct?
    1. **The best initial therapy for an overdose of acetaminophen (paracetamol) is the N-acetylcysteine which works by replacing the glutathione reductase that is depleted from the metabolites of acetaminophen.**
    2. Glutathione is effective because it crosses cell membranes readily.
    3. Administration of N-acetylcysteine within 24-48 hours after acetaminophen over-dosage has been shown to protect victims from hepatotoxicity and death.
    4. Glucoronidation and sulhation are less important pathways in acetaminophen metabolism.

34. Which of the following equations is correct related to the loading dose?
    1. **Loading dose = VD x TC (target concentration).**
    2. Loading dose = VD x K_{el} (elimination rate).
    3. Loading dose = Cl x TC
    4. Loading dose = TC x Accumulation factor.

35. All of the following statements are correct, except:
    1. In binding of drugs to plasma proteins plasma albumin is most important; B-globulin and acid glycoprotein also bind some drugs.
    2. Extensive protein binding slows drugs elimination (metabolism and/or excretion by glomerular filtration).
    3. **Plasma albumin less binds acidic drugs.**
    4. Saturable binding sometimes leads to a non-linear relation between dose and free (active) drug concentration.

36. The first-pass metabolism of a drug can be avoided by the following routes of administration, except:
    1. Sublingual
    2. **Oral**
    3. Rectal
    4. Intravenous.

37. All of the following statements are true, except:
    1. Bioavailability is the fraction of an ingested dose of a drug that gains acces to the systemic circulation.
    2. Two related drugs are bioequivalent if they show comparable bioavailability and similar time to achieve peak blood concentration.

3. Bioequivalence implies that if one formulation of a drug is substituted by another, no clinically untoward consequences will ensue.
4. **Two drugs that are bioequivalent, always are therapeutically equivalent.**

38. Which of the following statements is correct?
    1. **Volume of distribution (VD) is defined as the volume of plasma that would contain the total body content of the drug at a concentration equal to that in the plasma.**
    2. Lipid-insoluble drugs reach all compartments and may accumulate in fat.
    3. Lipid soluble drugs are mainly combined to plasma and interstitial fluids.
    4. Most of lipid soluble drugs do not enter the brain following the acute dosing.

39. Choose the correct answer:
    The major compartment are:
    1. **Plasma (5% of body weight)**
    2. Interstitial fluid (35%)
    3. Intracellular fluid (15%)
    4. Fat (2%).

40. Choose the correct answer:
    1. Non-polar drugs are generally poorly absorbed from the gut.
    2. Absorption from the gut does not depend on particle size.
    3. **For drugs that accumulate outside the plasma compartment (e.g. in fat, or by being bound to tissues) VD may exceed total body volume.**
    4. Absorption from the gut does not depend on physiochemical interaction with gut contents.

41. Choose the correct answer:
    1. Drug metabolites have less pharmacologic effects
    2. All drugs metabolism takes place in liver.
    3. **Only the unbound (free) drug fraction has pharmacological effect.**
    4. All drugs must first be metabolized before they can be excreted.

42. Which of the following statement is true for a drug whose elimination from plasma shows first order kinetics?
    1. The amount eliminated per unit of time is constant.
    2. **The rate of elimination is proportional to the plasma concentration.**
    3. The half-life of the drug is proportional to the drug concentration in plasma.
    4. Elimination involves a rate-limiting enzymic reaction operating at its maximal velocity (Vm).

43. The addition of glucoronic acid to a drug:
    1. Is an example of phase I reaction
    2. Occurs at the same rate in adults and newborns.
    3. **Usually leads to inactivation of the drug.**
    4. Decreases its water solubility.

44. Drugs showing zero-order kinetics of elimination:
    1. **Show a plot of drug concentration versus time that is linear.**
    2. Have a half-life independent of the dose.
    3. Decrease in concentration exponentially with time.
    4. Are more common than those showing the first-order kinetics.

45. Choose the wrong answer:
    1. Some drugs are destroyed by the acid or enzymes in the gut and must be given parenterally.

2. Drug that is bound to plasma proteins is combined to the vascular system and is not able to exert its pharmacological actions.
3. The absorption of unionized molecules is favored because they are far more lipid-soluble than those that are ionized.
4. **Active transportation processes are mainly used to transfer lipid-soluble drugs against their concentration gradients**.

46. Drugs cross the lipid membranes mainly by:
    1. Endocytosis
    2. **Passive diffusion**
    3. Facilitated diffusion
    4. Filtration

47. Choose the wrong answer:
    1. Many drugs are weak acids or weak bases; their state of ionization varies with PH according to the Henderson-Hassebalch equation.
    2. With weak acids or bases, only the uncharged species (the protonated form for a weak acid and the unprotonated form for a weak base) can diffuse across the lipid membranes; this gives rise to PH partition.
    3. Carrier-mediated transport (e.g. in the renal tubule, blood-brain barrier, gastrointestinal epithelium) is important for some drugs that are chemically related to endogenous substances.
    4. **The more important factor that determines the rate of passive diffusion transfer is a molecular weight.**

48. Choose the wrong answer:
    1. Plasma albumin binds mainly acidic drugs
    2. Basic drugs may be bound by β-globulin and acid glycoprotein.
    3. **Extensive protein binding speeds drug elimination (metabolism and/or excretion by glomerular filtration).**
    4. Competition between drugs for protein binding can lead rarely, to clinically important drug interactions.

49. Choose the wrong answer:
    1. A few drugs are absorbed by carrier-mediated transfer.
    2. Absorption from the gut depends on gastrointestinal motility and gastrointestinal PH.
    3. **Drugs of very low lipid solubility, including those that are strong acids or bases are generally readily absorbed from the gut.**
    4. Absorption from the gut depends on particle size.

50. Choose the wrong answer:
    1. Lipid soluble drugs reach all compartments and may accumulate in fat.
    2. **The most major compartment is the transcellular fluid.**
    3. Extensive protein binding slows drug elimination.
    4. Basic drugs may be bound by β-globulin and acid glycoprotein.

51. Choose the correct answer:
    1. **Phase I reactions of drug metabolism usually form more chemically reactive products, sometimes pharmacologically active, toxic or carcinogenic.**
    2. Some drugs show rapid first-pass hepatic metabolism and thus good oral bioavailability.
    3. Induction of enzymes by other drugs and chemicals can greatly slow hepatic drug metabolism.
    4. Absorption from the gut does not depends on gastrointestinal PH.

52. Choose the wrong answer:

1. For many drugs, disappearance from plasma follows an exponential time course characterized by the plasma half-life.
2. Plasma half-life, in simple case, is directly proportional to the volume of distribution and inversely proportional to the overall rate of clearance.
3. **With repeated dosage or sustained delivery of a drug the plasma concentration approaches a steady value within 2 plasma half-lives.**
4. A two-compartment model is often needed. In this case the kinetics are biexponent. The two components roughly represent the process of transfer between plasma and tissues (λ-phase) and elimination from the plasma (β-phase).

53. Choose the correct answer:
    1. **Some drugs show non-exponential "saturation" kinetics, with important clinical consequences, especially a disproportionate increase in steady-state plasma concentration when daily dose is increased.**
    2. Ethanol (alcohol) undergoes to first-order kinetics.
    3. because of PH partition weak acids are more rapidly excreted in acidic urine.
    4. Most drugs, highly bound to the plasma protein cross the glomerular filter freely.

54. Choose the correct answer:
    1. Water-soluble drugs are passively reabsorbed by diffusion across the tubule so are not efficiently excreted in the urine.
    2. **Several important drugs are removed predominantly by renal excretion and are liable to cause toxicity in elderly persons and patients having renal disease.**
    3. Phase II reactions are conjugation of reactive group and usually form active and poorly excretalble products.
    4. The addition of glucoronic acid to a drug occurs at the same rate in adults and newborns.

55. Choose the wrong answer:
    1. The greater the surface area: the faster absorption takes place.
    2. For absorption the drug must spend an adequate time at the absorption site.
    3. When a drug is taken intravenously (i.v.), 100% of the dose enters the systemic circulation and bioavailability is 1.0.
    4. **Plasma protein binding is not clinically important in disease state.**

Pharmacodynamics

56. Which of the following statements is correct?
    1. **Cellular responses to receptors that are ion channels are usually fast.**
    2. A drug usually binds to only one receptor.
    3. Cellular responses are rapid if the mode of action involves modification of DNA transcription.
    4. G-proteins do not amplify the effect of receptor stimulation.

57. The following statements describe pharmacodynamics concepts:
    1. Drug A is said to be more potent than drug B, if drug A's maximal effect is greater than that of drug B.
    2. A partial agonist is a drug that binds to a receptor without stimulating it.
    3. All drugs act by binding to cell macromolecules.
    4. **The expression therapeutic index refers to the difference between the concentration of a drug required to produce its effects and that required to produce toxicity.**

58. Choose the correct answer:
    1. Drug A is said to be more efficacious then drug B if drug A produces its maximum effect at a lower concentration than drug B.

2. **Receptors are continually being synthesized and destroyed by cell.**
3. Antagonists do not themselves bind to receptors, but interfere with agonists binding.
4. Competitive antagonist effect cannot be overcome by increasing the agonist concentration.

59. Choose the correct answer:
    1. A partial agonist is a drug that binds to a receptor without stimulating it.
    2. A partial agonist is a drug that binds to a receptor and produces maximal effect.
    3. A partial agonist always has decreased affinity for binding to receptors.
    4. **Partial agonists competitively inhibit the responses that produced by full agonists**

60. The following statements are true:
    1. **Competitive antagonists usually bind to receptors for very short periods.**
    2. Non-competitive antagonist usually bind to receptors in an reversible way.
    3. Following administration of a non-competitive antagonist, high concentration of agonist usually can reverse the antagonist effects.
    4. Binding of drug to receptor may involve only Van der Waals bonds.

61. Choose the correct answer:
    1. **Duration of an action of non-competitive antagonist depends largely on the turnover rate of receptors.**
    2. Drugs always may act independently of receptors.
    3. Efficacy is an minimal effect produces by a drug.
    4. TD_{50} – maximum dose which produces specific toxic effect in 50% of individuals (or animals).

62. Choose the correct answer:
    1. Potency is efficacy of a drug compared to a reference standard.
    2. **Competitive antagonist reversible binds to the receptor and prevents binding of the agonist.**
    3. ED_{50} is a dose which produces maximal response.
    4. Low therapeutic index – relatively low incidence of side effects at usual doses.

63. Choose the correct answer:
    1. **Most receptors are proteins, many with carbohydrate residues attached.**
    2. LD_{50} – maximum dose which kills 100% of animals.
    3. High therapeutic index-relatively high incidence of side effects at usually doses.
    4. A drug cannot have greater potency, but less efficacy than another drug.

64. Which of the following statements most accurately describes a system having spare receptors?
    1. Agonist affinity for spare receptors is less than their affinity for non-spare receptors.
    2. Spare receptors are active even in the absence of agonist.
    3. **A single drug-receptor integration results in many cellular response elements being activated.**
    4. Spare receptors are sequestered in the cytosol.

65. Choose the correct answer:
    1. In selecting a drug, a potency is usually more important than efficacy.
    2. If 10mg of drug "A" produces the same response as 100 mg of drug B, then drug A is more efficient than drug "B".
    3. The greater the efficacy, the greater the potency of a drug.
    4. **A competitive antagonist noncovalently binds to receptor.**

66. Choose the correct answer:
    1. **If the drug binding results in functional change, the binding site is called a receptor.**

2. Most agonist and antagonist drugs bind to their receptors with strong bonds.
3. Drug receptors can be divided only into two groups.
4. Irreversible action is characteristic feature of competitive antagonists.

67. Choose the wrong answer:
    1. **EC_{50} is a measure of the drug potency and its affinity for its receptor.**
    2. Chemical antagonism – binding of an agonist drug to a receptor that produces effects opposite to another agonist drug acting at a second receptor.
    3. Partial agonist – drugs that produce the same effect as the full agonist.
    4. A few drugs (general anaestetics, osmotic diuretics) act by virtue of their physicochemical properties and this is called specific drug action.

68. Which of the following statements is correct?
    1. The effects of competitive antagonists cannot be overcome by increasing doses of full agonists.
    2. **A competitive antagonist has no intrinsic efficacy.**
    3. All the receptors need to be occupied to elicit maximum response after the drug administration
    4. Competitive antagonists do not bind to the receptor site, but prevent the response to an agonist.

69. Choose the correct answer:
    1. **A drug that is a partial agonist in a tissue having no receptor reserve may be a full agonist in a tissue having many "spare" receptors, because its poor efficacy can be offset by activating larger number of receptors than that required by full agonist.**
    2. The higher the receptor affinity of the drug, the higher the concentration at which it produces the given occupancy level.
    3. Agonist effect depends on its affinity to receptor binding sites.
    4. Antagonists bind to receptors and initiate changes in cell function.

70. Choose the wrong answer:
    1. Inverse agonists show selectivity to the resting state of receptors, this being significant only in unusual situations, where the receptors show constitutive activity.
    2. For antagonists, efficacy is zero.
    3. Full agonists produce maximal effects.
    4. **Full agonists show selectivity for the resting state of receptors.**

71. Choose the correct answer:
    1. Steroid receptors are localized in cell membrane.
    2. Steroid receptors coupled with G-proteins.
    3. **Transmembrane tyrosine kinase receptors are located in cell membrane.**
    4. JAK-STAT receptor type stimulation activates the membrane G protein.

72. Which of the following statements is correct?
    1. Steroid receptors activation stimulates the membrane G protein that modulates an enzyme or channel.
    2. **Steroid receptors activation modulates gene expression in the nucleus.**
    3. JAK-STAT receptors interact with insulin.
    4. G-protein-coupled receptors are located in cytoplasm.

73. JAK-STAT receptors interact with:
    1. Estrogens
    2. Insulin
    3. **Cytokines**
    4. Acetylcholine

74. Transmembrane tyrosine kinase receptors interact with:
    1. **Insulin**
    2. Norepinephrine
    3. Corticosteroids
    4. Acetylcholine

75. Which of the following agents activates a membrane G-protein that modulates an enzyme or channel?
    1. Corticosteroid, thyroid hormone and estrogen
    2. **Norepinephrine**
    3. Insulin
    4. Cytokines.

76. Which of the following agents activates ion channels?
    1. **Acetylcholine via nicotinic receptor.**
    2. Acetylcholine via muscarinic receptor.
    3. Insulin
    4. Cytokines.

77. Insulin action is associated with:
    1. Membrane G-proteins.
    2. **Transmembrane tyrosine kinase.**
    3. Activation of steroid receptor.
    4. Ion channels opening.

78. Activation of cytoplasmic protein kinase (STAT) results from the action of:
    1. Norepinephrine
    2. Acetylcholine
    3. **Cytokines**
    4. Corticosteroids.

79. Insulin:
    1. Activates a membrane G-protein that modulates an enzyme or channel.
    2. **Activates transmembrane tyrosine kinase, which phosphorylates cytoplasmic proteins.**
    3. Opens ion channels to permit ion diffusion.
    4. Activates steroid receptors resulting in modulation of gene expression in the nucleus.

80. G-protein-coupled receptors activation:
    1. Phosphorylates cytoplasmic proteins.
    2. **Modulates an enzyme or channel.**
    3. Activates cytoplasmic protein kinase (STAT).
    4. Modulates gene expression in the nucleus.

81. Steroid-type receptors are activated by the following agents, except:
    1. **Norepinephrine**
    2. Estrogens
    3. Corticosteroids
    4. Thyroid hormone

82. Choose the wrong answer:
    1. A drug that chemically binds an agonist drug and prevents it from acting on its receptors is a chemical antagonist.

2. Drugs that within a chemical family may all bind to the same receptor but not all produce the same maximum effect are called partial antagonists.
3. Drugs that produce less than the full effect observed for that receptor system even when given in doses that fully saturate the receptors are called partial agonists.
4. **Partial agonists act like irreversible pharmacologic antagonists when combined with full agonist.**

83. Choose the wrong answer regarding the drug receptors:
    1. Receptors are continually being synthesized and destroyed by the cell.
    2. G-proteins amplify the effect of receptor stimulation.
    3. **A drug usually binds to only one receptor type.**
    4. Cellular responses are slow if the action mode involves modification of DNA transcription.

84. Choose the correct answer regarding the antagonists:
    1. **If competitive, can be overcome by increasing the agonist concentration.**
    2. Bind to receptors and stimulate them.
    3. If competitive, usually bind to receptors for very long period.
    4. May bind to receptors only by covalent bonds.

85. Choose the correct answer:
    1. Cellular responses to receptors that are ion channels, are usually slow
    2. Partial agonist is a drug that binds to receptor without stimulating it.
    3. All drugs act by binding to cell macromolecules.
    4. **Irreversible antagonists bind to receptors without stimulating them.**

86. Which of the following statements most accurately describes a system, having spare receptors?
    1. Agonist ability for spare receptors is less than their affinity for nonspare receptors.
    2. Spare receptors are active even in the absence of agonist.
    3. Spare receptors are more sensitive to partial agonists.
    4. **A single-drug receptor interaction results in many cellular response elements being activated.**

87. Choose the correct answer:
    1. Physiological antagonists simply bind to the active drug and inactivate it.
    2. **Non-competitive antagonists do not bind to the receptor site, but act downstream to prevent response to the agonist.**
    3. The affinity constant (K1. is reciprocal of dissociation constant (Kd) and in the absence of receptor reserve is the concentration of drug, that produces less than 50% of the maximum response.
    4. Partial agonists can elicit the same maximum response as full agonists if they have the same affinity to the receptor.

88. Choose the correct answer:
    1. Intrinsic activity is the chemical property of competitive antagonist.
    2. **Full and partial agonists may have the same affinity to same receptor.**
    3. All drugs act by binding to cell macromolecules.
    4. Antagonists do not bind themselves to receptors but interfere with the binding of agonist.

89. Choose the correct answer:
    1. When acting alone at receptor, partial agonists stimulate physiological response, but they cannot antagonize the effects of full agonists.
    2. **Intrinsic activity is a property of agonists**.
    3. Intrinsic activity is a measure of how avidly a drug binds to its receptor.
    4. A drug that is a partial agonist, in a tissue with no receptor reserve, cannot be a full agonist in a tissue, possessing many “spare” receptors.

90. Choose the correct answer:
    1. **Partial agonist – receptor complex has less affinity for the transducer in contrast to the full agonist.**
    2. Inverse agonists increase constitutive activity of receptor.
    3. Inverse agonists have equal affinity for both receptor forms (Ra and Ri) and maintain the same level of constitutive activity.
    4. Inverse agonists have much higher affinity for the Ra conformation (constitutive activity) of receptor.

91. Choose the wrong answer regarding pharmacodynamics. Phramacodynamics processes include drugs:
    1. Pharmacologic effect
    2. interaction with receptors
    3. Side effects
    4. **Metabolism.**

92. Which of the following statements is correct?
    1. Pharmacodynamics describes the way the body affects the drug with time.
    2. **Pharmacodynamics describes drug-concentration - pharmacological effects.**
    3. Pharmacodynamics describes drug excretion processes.
    4. Pharmacodynamics describes special carriers using for the active transportation of drugs.

93. Choose the correct answer:
    1. **A few drugs act due to their physicochemical properties and this is called the non-specific drug action (e.g. osmotic diuretics).**
    2. Many drugs exert their effects only by binding to plasma proteins.
    3. Receptors are not responsible for selectivity of drug action.
    4. Only a few drugs produce their effects by acting on specific protein molecules usually located in the cell membrane.

94. Which of the following statements is correct?
    1. The duration of action of irreversible antagonist is more dependent of its own rate of elimination and relatively independent on the rate of turnover of receptor molecules.
    2. Non-competitive antagonists' actions are usually reversible.
    3. Receptors mediate the actions only of pharmacologic antagonists.
    4. **Partial antagonist cannot elicit the same maximum response as a full antagonist.**

95. Choose the correct answer:
    1. **Nuclear receptors for steroid hormones regulate gene transcription and protein synthesis.**
    2. Steroid hormone receptors are located only in cytoplasm.
    3. Nuclear receptors are kinase-linked receptors that possess intrinsic tyrosine-kinase activity and include receptors for insulin and growth factors.
    4. G-protein coupled receptors are linked usually to physiological responses without involving the second messengers.

96. Choose the wrong answer:
    1. G-protein coupled receptors form a family of receptors with seven membrane –spanning helices.
    2. G-protein coupled receptors are located in the cell membrane.
    3. **Nuclear receptors for steroid hormones are linked to G-protein.**
    4. Transmembrane tyrosine kinase receptor type is activated by insulin.

97. Gs protein activation usually increases the intracellular concentration of:
    1. cGMP
    2. IP3

3. DAG
4. **cAMP**

98. Gq protein activation usually increases the activity of:
    1. guanylyl cylase
    2. cGMP
    3. **Phospholipase "C"**
    4. Adenylyl cyclase

99. Which of the receptors are associated with tyrosine kinase molecules (JAK) and activation of transcription (STAT) molecules?
    1. **Cytokine receptors**
    2. Kinase-linked receptors for insulin
    3. Agonist (ligand)-gated channels
    4. G-protein coupled receptors.

100. The activation of Gi protein includes:
    1. Increase of phospholipase "C" activity
    2. Decrease of cGMP concentration
    3. **Opening of cardiac K^+ - channels and slowing of heart rate.**
    4. Increase of cAMP concentration.

101. B-arrestin binding accelerates endocytosis for:
    1. Steroid receptors
    2. Cytokine receptors
    3. **Serpentine receptors**
    4. Kinase-linked receptors.

102. Steroid receptors activation:
    1. Activates the membrane G protein that modulates an enzyme or channel.
    2. **Modulate gene expression in the cell nucleus.**
    3. phosphorylates cytoplasmic proteins
    4. Activates the cytoplasmic protein kinase (STAT).

103. Location of G-protein coupled receptors:
    1. Nucleus
    2. Cytoplasm and nucleus
    3. **Cell membrane**
    4. Cytoplasm

104. Location of JAK-STAT receptors:
    1. Nucleus
    2. Only cell membrane
    3. **Cell membrane and cytoplasm**
    4. Only cytoplasm

105. Which type of receptors is located in cell membrane and cytoplasm?
    1. Steroid
    2. **JAK-STAT**
    3. Transmembrane tyrosine kinase
    4. G-protein coupled

106. Ion channel receptors are located in:
1. Cell membrane and cytoplasm
2. Nucleus
3. **Cell membrane**
4. Cytoplasm

107. Receptor type for insulin:
1. Ion channel
2. **Transmembrane tyrosine kinase**
3. Steroid
4. G-protein coupled

108. Receptor type for cytokines:
1. Steroid
2. **JAK-STAT**
3. G-protein coupled
4. Transmembrane tyrosine kinase

109. Substance examples for ion channel receptors:
1. Cytokines
2. Acetylcholine (muscarinic receptor)
3. **Acetylcholine (nicotinic receptor)**
4. Norepinephrine

110. Substance examples for JAK-STAT receptors:
1. Acetylcholine (nicotinic receptor)
2. Insulin
3. Steroids
4. **Cytokines**

111. Choose the correct answer:
1. Most agonist and antagonist drugs bind to their receptors with strong, covalent bonds, resulting in irreversible action.
2. The EC_{50} (the concentration of drug that produces 50% of maximal effect) is a measure of the drug efficacy.
3. Comparison of the maximal dose to produce the toxic effect may be carried out to determine the therapeutic index (TI).
4. **The activation of Gs protein leads to accumulation of cAMP.**

112. Choose the wrong answer:
1. **Tolerance to the drugs effect is the state when the effect intensity of a given drug dose is increased compared to the effect, seen in most individuals**.
2. When responsiveness diminishes rapidly after administration of a drug, the response is said to be subject to tachyphylaxis.
3. The idiosyncratic responses are usually caused by genetic differences in metabolism of drug, or by immunologic mechanisms, including allergic reactions.
4. The therapeutic index is used for description of drug safety.

113. Partial agonists are the:
1. Drugs that produce a stronger response at full receptor occupancy than do the full agonists.
2. Drugs that bind to receptor site without activating it.
3. Drugs that may bind to the receptor and produce the maximum effect.

4. **Drugs that have less affinity to receptor-transduction complex than the full agonist.**

114. Choose the correct answer:
1. **When acting alone at receptors partial agonists stimulate a physiological response, but they can antagonize the effect of a full agonist.**
2. Partial agonists may act as irreversible antagonist.
3. Partial agonists bind to receptors usually by covalent bonds.
4. Partial agonists do not activate spare receptors.

115. Choose the correct answer:
1. Partial agonists stimulate active site of receptor like inverse agonists.
2. Partial agonists bind to a receptor site without activating it.
3. **A drug that is partial agonist in tissue with no receptor reserve may be a full agonist in a tissue possessing many "spare" receptors.**
4. Competitive antagonists bind irreversibly with receptors and the tissue response cannot be returned to normal by increasing the dose of agonist.

116. Choose the correct answer:
1. **Affinity is a measure of how avidly a drug binds to its receptor.**
2. The competitive antagonists have intrinsic efficacy by occupying a proportion of the receptors
3. Full agonist cannot overcome the action of competitive antagonist.
4. The most studied second messengers are K^+-ions.

117. Choose the correct answer:
1. Intrinsic efficacy is a measure of how avidly a drug binds to the receptor.
2. Affinity is the ability of an agonist to alter the conformation of a receptor in such a way that it elicits a response in the system.
3. **Drug molecules in the environment of receptors are attracted initially by relatively long-range electrostatic forces and then if the molecule is suitably shaped to it closely to the binding site of the receptor, hydrogen bonds and van der Waals forces briefly bind the drug to the receptor.**
4. The activation of Gi protein is accompanied by accumulation of the second messenger cAMP.

118. The activation of Gq protein leads to increase of the content of:
1. **ITP_3 and DAG**
2. cAMP
3. cGMP
4. K^+-ions

119. Choose the correct answer:
1. Stimulation of Gi protein is linked with increased activity of adenylyl cyclase.
2. Stimulation of Gq protein leads to decrease activity of phosoholipase "C".
3. **Stimulation of Gs protein is linked with the increased activity of adenylyl cyclase.**
4. The second messengers include only cAMP, ITP_3 and DAG.

120. The following receptors are called the "serpentine" receptors:
1. Nuclear
2. Transmembrane tyrosine kinase type
3. **G-protein coupled**
4. JAK-STAT type.

121. Choose the correct answer:

1. Gene-active hormones can be expected to alter the pathologic state within minutes (e.g. glucocorticoids).
2. **The effects of gene-active hormones can persist for hours or days after the agonist concentration has been reduced to zero.**
3. The beneficial (or toxic) effects of the gene-active hormone usually decrease rapidly when the hormone administration is stopped.
4. Voltage-gated ion channels bind neurotransmitters directly and they do not control by membrane potential.

122. Which of the following statements is correct?
1. **Drugs that bind to the same receptor molecule, but do not prevent binding of the agonist act allosterically and may enhance or inhibit the agonist action.**
2. Kd (the equilibrium dissociation constant) is the concentration of free drug for 100% saturation of receptors and is inversely proportionate to the affinity of drug for receptors.
3. If the equilibrium constant of free drug is low, binding affinity is also low.
4. Some drugs often called allosterically modulators, bind to a separate site on the receptor protein and alter the receptor function by inactivating the receptor.

123. Tolerance to drug may occur:
1. **If the body adapts to the continual presence of a drug so that greater doses are required to achieve the same effect**
2. When agonist binding induces the accelerated endocytosis of receptors from the cell surface, followed by the degradation of those receptors and their bound ligand.
3. After a cell or tissue has been exposed for a period of time to an agonist and that tissue becomes less responsive to further stimulation by that agent.
4. After repeated administration of an agonist agent in the small time intervals.

124. Which term is used when the total number of cell-surface receptors is reduced and the cells responsiveness to ligand is correspondingly diminished?
1. Desensitization
2. Up-regulation
3. **Down-regulation**
4. Tachyphylaxis

125. Receptor "up-regulation" more frequently may be developed after long-term exposure to:
1. **Competitive antagonist**
2. Full agonist
3. Partial agonist
4. Inverse agonist

126. A 70-year old man has been taking beta-blockers for many years for his angina pectoris. He develops intermitten claudication (the complication characteristic for beta-blockers) and his doctor stops the beta-blocker. Suddenly his angina worsens within days and he is taken to hospital with myocardial infarction. In this case it is likely that beta receptors undergo:
1. Down-regulation
2. Desensization
3. **Upregulation**
4. Hypersensitivity

127. Choose the correct answer:
1. **Drugs with broad therapeutic windows are generally safe and easy to use.**

2. Drugs with narrow therapeutic windows are less toxic and can be used without measuring of their plasma concentration.
3. Competitive antagonists form bonds with receptor molecules that are irreversible.
4. Non-competitive antagonists form bonds with the receptor, usually at the "natural" agonist-binding site.

128. Choose the correct answer:
1. **When covalent bonding occurs, the inhibition of effect cannot be overcome entirely no matter how high the agonist concentration raised.**
2. Individuals continually exposed to an agonist predictable do not require larger doses to achieve a given effect.
3. Receptors may undergo to "up regulation" after chronic exposure to agonist drug.
4. Genetic variation in the sensitivity of a receptor to a drug is not established.

129. A 40-year-old man has been abusing diamorphine (heroin) for many years, which is opioid receptor agonist. Gradually, the dose needed to achieve the desired effect (euphori1. has increased. He is found dead in his flat (heroin is respiratory depressant).
What is the reason for gradually increasing dose of heroin regarding to opioid receptors?
1. Upregulation
2. **Downregulation**
3. Tachyphylaxis
4. Hypersensitivity

130. Which routes of drug administration can produce the most rapid effect?
1. Rectal
2. Oral
3. Transdermal
4. **Sublingual**

131. cAMP accumulation is associated with the activation of the following proteins:
1. Gq
2. Gi
3. **Gs**
4. Gt_1, Gt_2.

132. ITP_3 and DAG concentration are increased by the stimulation of the:
1. **Gq protein**
2. Adenylyl cyclase
3. Gi protein
4. Gt_1, Gt_2 proteins.

133. ITP_3 and DAG concentration are linked with the activation of:
1. Adenylyl cyclase
2. **Phospholipase "C"**
3. Gi protein
4. Gs protein

134. Which of the following proteins is the inhibitory one?
1. Gs
2. Gq
3. Gt_1, Gt_2
4. **Gi**

135. Which of the following proteins are linked with phototransduction process?
1. **Gt_1, Gt_2**
2. Gs
3. Gi
4. Gq

136. Which of the following proteins activation can decrease cGMP concentration?
1. Gi
2. Gq
3. **Gt_1, Gt_2**
4. Gs

137. The specific toxicity of drugs include all of the following, except of the:
1. **General toxicity**
2. Reproductive toxicity
3. Immunotoxicity
4. Teratogenic toxicity

138. Which one of the clinical trial phase determines the useful dose range, pharmacokinetics and minimal toxic effect?
1. **Phase I**
2. Phase II
3. Phase III
4. Phase IV

139. Determine the efficacy of the drug on the target disease under conditions of typical use is associated with:
1. Phase I
2. Phase II
3. **Phase III**
4. Phase IV

140. Surveillance of toxicities reported during the normal use is linked to:
1. Phase I
2. Phase II
3. Phase III
4. **Phase IV**

141. Determine the efficacy of the drug on the target disease under highly controlled conditions is associated with:
1. Phase I
2. **Phase II**
3. Phase III
4. Phase IV

142. Choose the correct answer:
1. Special carriers using for the active transport of drugs are non-selective and non-inhibitable.
2. Inverse agonists have equal affinity for both receptor forms (Ra and Ri) and maintain the same level of constitutive activity.
3. **The relationship between a dose of the drug and its effect describes the pharmacodynamics process.**
4. Only the bound drug fraction has the pharmacological effects.

143. Which of the following drugs can produce the contrasting physiologic results?
1. Full agonist
2. **Inverse agonist**
3. Competitive antagonist
4. Irreversible antagonist.

144. Who protects the patients' rights involved in clinical trials?
1. Scientific council
2. Drug monitoring council
3. **Ethic committee**
4. Chief investigator

145. How is called a drug with patent time expired?
1. Orphan
2. **Generic**
3. OTC (over the counter)
4. Innovative

146. Choose the correct answer:
1. **Receptors are responsible for selectivity of drug action.**
2. Many drugs exert their effects by binding to plasma proteins.
3. Once the irreversible antagonist has occupied the receptor, it need to be present in unbound form.
4. Partial agonists may produce maximal effects if they fully saturate the receptors.

147. Choose the correct answer:
1. Receptors mediate the actions only of pharmacologic agonists.
2. **Some drugs are destroyed by the acid or enzymes in the gut and must be given sublingually.**
3. Physiologic antagonists simply bind to the active drug and inactivate it.
4. When acting alone at receptor the partial agonists decrease physiologic response.

148. Choose the wrong answer:
1. Partial agonists always have the less affinity to receptors than full agonists.
2. **Intrinsic efficacy is the property of the partial agonist.**
3. Partial agonists increase the effects of full agonists by their concomitant use.
4. Intrinsic efficacy is the chemical property of irreversible antagonist.

149. Choose the correct answer:
1. The affinity of a drug to corresponding receptor is responsible for its maximal effect.
2. **Transducer leads to conformational changes of receptors.**
3. Intrinsic efficacy of a drug is not linked to the transducer function.
4. G-protein does not play significant role as a transducer.

150. Choose the wrong answer:
1. **G-proteins attenuate the effect of receptor stimulation**
2. Cellular responses to receptors that are ion channels are usually fast.
3. Partial agonists may act as competitive antagonists.
4. The selectivity characteristic is required to avoid constant activation of the receptor by promiscuous binding of many different ligands.

The autonomous nervous system. Adrenergic agonists

151. Choose the correct answer:
1. Dobutamin iv is indicated for shock secondary to gastrointestinal hemorrhage.

2. Norepinephrine iv causes bronchodilation.
3. Salbutamol has higher affinity for B_1-adrenoceptors than for B_2-adrenoceptors.
4. **Isoprenaline binds to both B_1 and B_2-adrenoceptors.**

152. Choose the correct answer:
1. Dobutamin is a specific B_2-agonist of adrenoceptors.
2. Norepinephrine has strong activity at B_2-adrenoceptors.
3. **I.V. injection of Norepinephrine may cause reduction of heart rhythm.**
4. Salbutamol given I.V. causes bradycardia.

153. The action of Norepinephrine:
1. **Is potentiated by inhibitors of monoamine oxidase A (MAO-"A").**
2. Is decreased by tricyclic antidepressants.
3. Includes vasodilation in some arteriolar beds.
4. Is based on its binding to B_2-adrenoceptors.

154. The action of Norepinephrine:
1. **Is potentiated by cocaine.**
2. Includes more expressed hyperglycemia that observes with epinephrine.
3. Is terminated mainly by MAO-"B".
4. I.V. causes bronchodilation.

155. Choose the correct answer:
1. **Dobutamine i.v. is indicated for cardiogenic shock during myocardial infarction.**
2. Salbutamol given i.v. causes bronchoconstriction.
3. Norepinephrine has a little activity at α_1-adrenoceptors.
4. Monoamine oxidase B (MAO-"B") metabolises Norepinephrine and serotonine (5-HT).

156. Choose the correct answer:
1. Dopamine is metabolized by MAO-"A".
2. **Norepinephrine action is terminated by its uptake from the synapse.**
3. Dobutamine has a little affinity for B_1-adrenoceptors.
4. Salbutanol is B_1-adrenoceptors agonist drug.

157. Which of the following drugs is selective B_2-adrenoceptors agonist?
1. **Terbutalin**
2. Isoproterenol
3. Norepinephine
4. Epinephrine

158. Which of the following drugs causes marked hypertension?
1. Terbutalin
2. Isoproterenol
3. Salbutamol
4. **Norepinephine**

159. Which of the following drugs is used in opthalmology for pupillary dilation?
1. Isoproterenol
2. Salbutamol
3. **Phenylephrine**
4. Terbutaline

160. A 70-year-old man presents to the emergency department with acute heart failure. You decide that this patient needs immediate drug therapy to improve his cardiac function. Which of the following drugs would be most beneficial?
1. Phenylephrine
2. Isoproterenol
3. **Dobutamine**
4. Albuterol

161. Which of the following agents can selectively stimulate B_1-adrenoceptors?
1. Phenylephrine
2. Metoxamine
3. **Dobutamine**
4. Salbutamol

162. Remedies for nasal stuffiness often contain which of the following drugs?
1. Norepinephrine
2. Epinephrine
3. Terbutaline
4. **Phenylephrine**

163. Which of the following agents have the most affinity to α_1-adrenoceptors?
1. **Norepinephrine**
2. Terbutaline
3. Albuterol
4. Dobutamine

164. Which of the following adrenoceptors agonists can stimulate α_1, α_2, B_1, B_2 and B_3 adrenoceptors?
1. Norepinephrine
2. **Epinephrine**
3. Phenylephrine
4. Albuterol

165. Catecholamines include the following agents, except:
1. Dopamine
2. Noreprnephrine
3. Epinephrine
4. **Serotonine**

166. Which agent is synthesized in the adrenal medulla?
1. Dopamine
2. **Epinephrine**
3. Noreprnephrine
4. Serotonine

167. Which agent is synthesized and released by adrenergic neurons, most postganglionic sympathetic neurons and the adrenal medulla?
1. Dopamine
2. **Noreprnephrine**
3. Serotonine
4. Epinephrine

168. α_1-adrenoceptors are located in the following organs, except:

1. Most vascular smooth muscle (innervated)
2. Pupillary dilator muscle
3. Prostate
4. **Platelets**

169. α_2-adrenoceptors are located in the following organs, except:
1. Platelets
2. Adrenegic nerve terminals
3. Fat cells
4. **Heart**

170. The stimulation of α_1-adrenoceptors produce the following effects, except:
1. Vasoconstruction and hypertensive reaction
2. Pupil dilation
3. Prostate contraction
4. **Decrease force of heart contraction.**

171. The stimulation of α_2-adrenoceptors produce the following effects, except:
1. Platelets aggregation
2. Inhibition of transmitter (norepinephrine) release
3. Inhibition of lipolysis
4. **Erects hair**

172. The stimulation of B_1-adrenoceptors produce the following effects, except:
1. **Promotes bronchial smooth muscle relaxation.**
2. Increases force and rate of heart contraction.
3. Increases rennin release
4. Increases conductance in the heart.

173. The main places of B2-adrenoreceptors location are the following, except:
1. Respiratory, uterine, and vascular smooth muscle
2. Skeletal muscle
3. Human liver
4. **Fat cells**

174. The stimulation of B2-adrenoreceptors caused the following effects, except:
1. Bronchodilation
2. Promotes potassium uptake by skeletal muscles
3. Activates glucogenolysis
4. **Activates lypolysis**

175. The activation of B3-adrenoreceptors is accompanied by:
1. Tachycardia
2. Bronchodilation
3. Pupil dilation
4. **Lypolysis**

176. Choose the correct answer:
1. **The stimulation of α -adrenoceptors predominantly exert the excitatory effects.**
2. Dopamine is precursor of epinephrine
3. Dopamine D_1 receptors are placed in nerve endings.
4. Dopamine D_2 receptors are located in smooth muscle.

177. Choose the correct answer:
1. Dopamine receptors can be divides into 3 groups.
2. Dopamine D_1 receptors functionally are identical to D_2 receptor
3. **Dopamine D_2, D_3 and D_4 receptors have similar functions, while D_1 and D_5 receptors constitute one identical group with the same function.**
4. The activation of D_2, D_3 and D_4 receptors tend to increase the cAMP content in contrast to D_1 and D_5 receptors stimulation.

178. Choose the correct answer concerning norepinephrine:
1. **Norepinephrine binds at α and B_1 adrenergic receptors; little action has at B_2 adrenergic receptors**
2. Red ealy crosses the blood-brain barrier.
3. Is effective via oral administration
4. Well-absorbed from sites of subcutaneous injection.

179. Norepinephrine:
1. Slowly inactivated by COMT and MAO enzymes
2. **Usually given by intravenous infusion**
3. Is effective bronchodilator
4. is more effective than dobutamine in hemodynamic shock.

180. Norepinephrine side effects include the following, except:
1. Ischemic damage due to potent vasoconstriction and tissue hypoxia.
2. Decreased perfusion of kidneys and extremities with high doses (limits use in treatment of shock).
3. necrosis due to extravasation at the injection site
4. **Uterine muscle relaxation**.

181. Choose the correct answer concerning epinephrine:
1. **Binds at α_1, α_2, B_1 and B_2 receptors.**
2. Localized vasodilation results in good absorption from subcutaneous tissues.
3. Slowly metabolized in gastrointestinal mucosa and liver, is orally effective
4. Is effective for treatment of myocardial infarction.

182. Indications for epinephrine use include the following, except:
1. Bronchospasm in acute asthma.
2. Anaphylaxis (given parentally).
3. Cardiac arrest – increases cardiac electric activity.
4. Heart failure.

183. Indications for epinephrine use include:
1. **Use with infiltration anesthetics to prolong effect (decreased systemic absorption).**
2. Hyperthyroidism
3. Diabetis
4. Cardiogenic shock

184. Side effects and toxicity of epinephrine comprise the following, except:
1. Palpitations, arrhythmias, hypertension
2. Anxiety
3. Tremor
4. **Hypoglycemia**

185. Choose the correct answer regarding to dopamine:

1. Stimulates D_1-dopamine receptors and reduces adenylyl cyclase activity.
2. Stimulates D_2-dopamine receptors and increases adenylyl cyclase activity.
3. Readily crosses the blood-brain barrier.
4. **Also acts as a B1-adrenoceptor agonist.**

186. The following reactions are produced be dopamine, with the exception of:
1. Stimulates the medullary chemoreceptor trigger zone and causes nausea and vomiting .
2. Inhibits prolactin release from the anterior pituitary.
3. Positive inotropic and chronotropic (B_1) effects – moderate to high doses.
4. **Low dose causes vasoconstriction and high dose- vasodilation.**

187. Choose the wrong answer related to dopamine:
1. Readily metabolizes by COMT and MAO.
2. MAO-"B" is responsible for dopamine metabolism.
3. Modification of muscle tone
4. **Renal arterial vessels do not possess dopamine receptors.**

188. Indications for dopamine use include the following, except:
1. Shock (drug of choice)
2. Oliguria secondary to decreased renal blood flow
3. **Arterial hypertension**
4. Impaired renal function during shock

189. Choose the wrong answer regarding dopamine:
1. Low dose - increases renal blood flow without affecting the systemic blood pressure (1-4 mcg/kg/min).
2. Higher dose – increases renal blood flow, myocardial contractility, chronotropy, but causes mild vasodilation (4-12 mcg/kg/min).
3. In most cases the high dose - increases the systemic blood pressure, myocardial contractility, chronotropy, but renal blood flow can decrease due to vasoconstriction (>12 mcg/kg/min).
4. **Also acts as B_1-adrenoceptor blocker.**

190. Side effects and toxicity of dopamine include the following, except:
1. With high doses – decrease renal perfusion.
2. Tachycardia.
3. Arrhythmias.
4. **Hypotension.**

191. Choose the correct answer:
1. B_1 and B_2 adrenoceptors agonist drug is phenylephrine.
2. Isoproterenol stimulates α_1-adrenoceptors
3. **Metoxamine is a α_1-adrenoceptor agonist drug**
4. Clonidine has a little central effect.

192. Which drug is relatively specific for α_1 adrenergic receptor sites?
1. Clonidine
2. **Phenylephrine**
3. Isoproterenol
4. Terbutalin

193. Which drug is used as nasal decongestant?
1. **Phenylephrine**
2. Clonidine

3. Methoxamine
4. Isoproterenol

194. Which drug causes the increase in blood pressure due to vasoconstriction and also leads to vagally-mediated bradycardia?
1. Clonidine
2. **Phenylephrine**
3. Isoproterenol
4. Terbutaline

195. Which drug stimulates α_1-adrenoceptors?
1. Isoproterenol
2. **Metoxamine**
3. Terbutaline
4. Isoproterenol

196. Choose the correct answer:
1. Phenylephrine is inactivated by COMT; has a longer duration of action than catecholamines.
2. **Phenylephrine causes mydriasis.**
3. Methoxamine side effect is not similar to phenylephrine.
4. Clonidine activates only α_1 adrenoceptors.

197. Choose the correct answer concerning clonidine:
1. **Activates α_2 adrenergic receptors in the cardiovascular control center of the brain stem.**
2. Reduces parasympathetic outflow leading to decreased vagal tone.
3. Poorly enters the brain
4. Causes excitation.

198. Which drug is used for treatment of withdrawal from opiates?
1. Phenylephrine
2. methoxamine
3. **Clonidine**
4. Isoproterenol

199. The following side effects such as orthostatic hypotension, dry mouth and sexual dysfunction, are characteristic for:
1. Terbutalin
2. Albuterol
3. **Clonidine**
4. Phenylephrine

200. Choose a drug with mixed activity for B_1 and B_2 adrenoceptors:
1. Dobutamine
2. Metaproterenol
3. Terbutaline
4. **Isoproterenol**

201. The following agents have relatively selective action for B_2-adrenoceptors, except:
1. Terbutalin
2. Albuterol
3. Salbutanol
4. **Dobutamine**

202. Which agent selectively stimulates B_1-adrenoceptors:

1. **Dobutamine**
2. Phenylephrine
3. Salbutamol
4. Terbutaline

203. Choose the wrong answer:

1. Isoproterenol lowers peripheral vascular resistance
2. Dobutamine has positive inotropic effect similar to dopamine but has less chronotropic effect and causes fewer arrhythmias and less ischemia than dopamine.
3. Dobutamine is relatively selective B1-adrenoceptor agonist drug.
4. **Isoproterenol contracts bronchial and gastrointestinal smooth muscle**.

204. Which drug is most rarely used for treatment of bronchial asthma?

1. Terbutalin
2. **Isoproterenol**
3. Albuterol
4. Metaproterenol

205. Which drug is not selective for B_2-adrenoceptors?

1. **Isoproterenol**
2. Terbutaline
3. Albuterol
4. Metaproterenol

206. Which drug is metabolized by COMT?

1. Terbutaline
2. Albuterol
3. Metaproterenol
4. **Dobutamine**

207. Which drug is indicated for use in congestive heart failure in the post-myocardial infarction period?

1. Isoproterenol
2. **Dobutamine**
3. Albuterol
4. Terbutaline

208. Choose the wrong answer:

The side effects of terbutaline, albuterol and metaproterenol include the following:

1. Nausea and vomiting
2. Tachycardia and dysrythmia
3. **Hypotension**
4. Headache and tremor

209. Which of the drugs are frequently used to delay delivery in premature labor?

1. **Terbutaline**
2. Albuterol
3. Isoproterenol
4. Metaproterenol

210. Choose adrenergic agonist with direct and indirect actions:

1. Amphetamine
2. Tyramine
3. **Ephedrine**
4. Epinephrine

211. Indirect acting adrenergic agonist is:
1. **Amphetamine**
2. Ephedrine
3. Epinephrine
4. Norepinerphine

212. Which agent is produced in the body endogenously by gut bacteria:
1. Ephedrine
2. Metaraminol
3. **Tyramine**
4. Norepinephrine

213. Which agent is present in red wines, beer, cheese, chocolate and many other foods?
1. Ephedrine
2. Norepinephrine
3. **Tyramine**
4. Metaraminol

214. Which agent mimics epinephrine in its spectrum of systemic effects?
1. Amphetamine
2. Tyramine
3. **Ephedrine**
4. Metaraminol

215. Which agent acts primarily through the release of catecholamines, but has some direct effects on adrenergic receptors at higher doses?
1. Amphetamine
2. Tyramine
3. **Ephedrine**
4. Metaraminol

216. Which agents peripheral effects are mediated by norepinephine (causes release of the stored NE), whereas the central effects are predominantly mediated by dopamine?
1. Tyramine
2. Ephedrine
3. **Amphetamine**
4. Norepinephrine

217. Which of the drug is used for the treatment of attention deficit disorder, narcolepry and for appetite suppression?
1. Ephedrine
2. **Amphetamine**
3. Tyramine
4. Metaraminol

218. Which of agents, ingested by a person taking an MAO inhibitor, can cause the massive release of catecholamines, which may induce hypertensive crisis and severe arrhythmias?

1. Amphetamine
2. **Tyramine**
3. Ephedrine
4. Metaraminol

219. Which of the drug is excreated mostly in unchanged form in urine?
1. **Amphetamine**
2. Tyramine
3. Norepinephrine
4. Epinerphine

220. Choose the agent which is resistant to metabolism by MAO and COMT with long duration of action:
1. **Ephedrine**
2. Tyramine
3. Norepinephrine
4. Epinephrine

221. Which agent is used for prevention of enuresis (increases bladder sphincter tone) and less extensively for bronchospasm?
1. Tyramine
2. Norepinephrine
3. Amphetamine
4. **Ephedrine**

222. Choose the agent which may cause tachyphylaxis with repetitive dosing?
1. **Ephedrine**
2. Norepinephrine
3. Epinephrine
4. Metaraminol

223. Choose a drug with the following side effects as: insomnia, dysphoria, psychotic reactions and impotence:
1. Ephedrine
2. **Amphetamine**
3. Tyramine
4. Norepinephrine

Adrenergic antagonists

224. Non-selective blockers of $\alpha_{1,2}$-adrenoceptors include:
1. **Phentholamine**
2. Prazosin
3. Terazosin
4. Tamsulozin

225. Choose the irreversible blocker of $\alpha_{1,2}$-adrenoceptors:
1. Prazosin
2. Tamsulosin
3. Doxazosin
4. **Phenoxybenzamine**

226. Choose the wrong answer regarding to phenoxybenzamine:
1. Increases norepinephine release by presynaptic nerve terminals.

2. blocks catecholamine-induced vasoconstriction; decrease blood pressure
3. **Does not enter the CNS**
4. Induces reflex tachycardia.

227. Phenoxybenzamine is not indicated for the treatment of:
1. Pheochromocytoma
2. Hyperitensive crises secondary to adrenergic agonist or MAO inhibitor overdosage.
3. Orally for preoperative management of hypertension in case of pheochromocytoma.
4. **For long-term uses in case of arterial hypertension.**

228. Choose the agent which induced marked reflex tachycardia:
1. Tamsulosin
2. Prazosin
3. Terazosin
4. Phenoxybenzamine.

229. Choose the agent with reversible blockade of α_1 and α_2 adrenoceptors:
1. Prazosin
2. **Phentolamine**
3. Terazosin
4. Phenoxybenzamine

230. Which agent is most effective for treatment of prostatic hyperplasia?
1. Prazosin
2. **Tamsulosin**
3. Terazosin
4. Doxazosin

231. The α_1-adrenoceptors selective blockers are used for the treatment of the following situations, except for:
1. Arterial hypertension
2. Prostatic hyperplasia
3. Raynaud's phenomenon
4. **Hypertensive crises associated with pheochromocytoma**.

232. First dose reaction –marked postural hypotension 30 to 90 minutes following the initial dose, is produced by the following agent, except for:
1. Terazosin
2. Doxazosin
3. Prazosin
4. **Phentolamine**

233. Which of the following agents covalently binds to α -adrenoceptors?
1. Tamsulosin
2. Terazosin
3. Phentolamine
4. **Phenoxybenzamine**

234. Choose the wrong answer regarding the side effects of phenoxybenzamine:
1. Nasal congestion
2. Orthostatic hypotension
3. Tachycardia
4. **Stimulation of ejaculation**

235. Which of the following agents produces more significant tachycardia?
1. Prazosin
2. Tamsulosin
3. **Phentolamine**
4. Terazosin

Beta-blocking agents

236. Choose the selective beta-adrenoceptors blocking agent:
1. Propanolol
2. Nadolol
3. Timolol
4. **Metoprolol**

237. Choose the non-selective beta-adrenoceptors blocking agent:
1. Atenolol
2. Bisoprolol
3. Metoprolol
4. **Pindolol**

238. Choose the competitive antagonist at α_1 and B_1 adrenergic receptors:
1. Esmolol
2. **Labetalol**
3. Metoprolol
4. Atenolol

239. Choose the contraindication for use of beta-blocking agents:
1. Arterial hypertension
2. ischemic heart disease
3. Prophylaxis of migraine
4. **Severe bronchial asthma**

240. Choose the wrong answer concerning the use of beta-blocking agents:
1. Supraventricular or ventricular arrhythmias.
2. Essential tremor.
3. **Very severe congestive heart failure (with profound reduction of cardiac inotropic function).**
4. Hyperthyroidism

241. Which effect is not characteristic for beta-adrenoceptors blocking agents?
1. Negative chronotropic
2. Negative inotropic
3. Negative batmotropic
4. **Positive dromotropic**

242. The less duration of action has a following beta-adrenoceptors bclocking agent:
1. Timolol
2. Propranolol
3. **Esmolol**
4. Metoprolol

243. Side effects of beta-adrenoceptors blocking agents include several conditions, except for:

1. Bradycardia
2. Bronchospasm
3. Hypertension and angina pectoris in case of abrupt withdrawal
4. **Increased sexual activity**

244. Which of the following beta-adrenoceptors blocking agent has the most duration of action?
1. Metoprolol
2. Esmolol
3. **Nadolol**
4. Pindolol

245. Which of the following agents produces partial agonist activity?
1. **Pindolol**
2. Propranolol
3. Metoprolol
4. Atenolol

246. Choose the beta-adrenoceptors blocking agent with intrinsic sympathetic activity:
1. Atenolol
2. Esmolol
3. **Pindolol**
4. Metoprolol

247. Mixed α1 and B adrenergic receptors blocking agent-Labetolol is used for the treatment of:
1. **Hypertensive emergencies**
2. Arrhythmias
3. Diabetes
4. Angina pectoris

248. Choose the adrenergic neuron blockers:
1. **Guanethidin**
2. Bisoprolol
3. Nadolol
4. Esmolol

249. Which drug prevents the re-uptake of neurotransmitters in adrenergic neurons into the vesicles leading to neurotransmitter depletion?
1. Guanethidin
2. Pindolol
3. **Reserpine**
4. Esmolol

250. Which drug inhibits peripheral adrenergic neurons by inhibiting Norepinephrine release?
1. Reserpine
2. Labetalol
3. **Guanethidin**
4. Bisoprolol

251. Side effects of reserpine include the following, except:
1. Psychiatric depression
2. Gastrointestinal disturbances
3. Tachycardia

4. Sexual dysfunction.

252. Choose the main side effects of adrenergic neurons blocking agent Guanethidin:
1. Bradycardia
2. **Severe orthostatic hypotension and sexual dysfunction**
3. Psychiatric depression
4. Hypoglycemia.

Cholinergic Agonists

253. Choose the cholinergic agonist with mixed action on muscarinic and nicotinic receptors:
1. Bethanehol
2. **Carbochol**
3. Metacholine
4. Pilocarpine

254. Relatively selective muscarinic cholinergic agonists are the following agents, except:
1. **Acetylcholine**
2. Pilocarpine
3. Methacholine
4. Bethanechol

255. Choose the wrong answer regarding the indications of muscarinic agonists:
1. Glaucaoma
2. Atonic bladder
3. Atonic bowel
4. **Arterial hypertension**

256. Choose the wrong answer:
1. Metacholine is more resistant to hydrolysis by cholinesterase than acetylcholine.
2. Potency to stimulate nicotinic receptors for carbachol is greater than for acetylcholine.
3. **Bethanechol and metacholine readily cross blood-brain barrier.**
4. Pilocarpine acts mostly at muscarinic receptors.

257. Which cholinergic agonist agent is mostly used for the treatment of glaucoma:
1. **Pilocarpine**
2. Bethanechol
3. Methacholine
4. Carbochol

258. The stimulation of muscarinic cholinoreceptors leads to:
1. **Myosis**
2. Dry mouth
3. Hypertensive reactions
4. Decreased motion of gastrointestinal tract.

259. The muscarinic over-activity side effects include the following symptoms, except for:
1. Nausea vomiting, abdominal pain
2. Diaphoresis, salivation
3. Urinary urgency
4. **Tachycardia**

260. Contraindications for using the muscarinic agonist drugs include:
1. **Bronchial asthma**
2. Atonic bladder
3. Atonic bowel
4. Glaucoma

261. The shortest acting anticholinesterase drug is:
1. Physostigmine
2. **Edrophonium**
3. Neostigmine
4. Demecarium.

262. Which drug causes irreversible inhibition of cholinesterase?
1. Pyridostigmine
2. **Echothiophate**
3. Edrophonium
4. Neostigmine

263. Carbamylating inhibition of cholinesterase caused the following agents, except for:
1. Physostigmine
2. Neostigmine
3. Pyridostigmine
4. **Echothiophate**

264. Phosphorylating inhibitor of cholinesterase is:
1. Demecarium
2. Edrophanium
3. **Echothiophate**
4. Neostigmine

265. Which anticholinesterases chemically belong to tertiary nitrogen?
1. **Physostigmine**
2. Edrophonium
3. Neostigmine
4. Pyridostigmine

266. A quarternary nitrogen anticholinesterase agents are the following drugs, except for:
1. Neostigmine
2. Demecarium
3. **Physostigmine**
4. Edrophonium

267. Which anticholinesterase drugs can be used for the treatment of glaucoma?
1. Edrophanium
2. **Physostigmine**
3. Neostigmine
4. Pyridostigmine

268. Which anticholinesterase drug most readily penetrates blood-brain barrier?
1. Neostigmine
2. Pyridostigmine
3. **Physostigmine**

4. Edrophonium

269. Choose the long-acting anticholinesterase agent:
1. Physostigmine
2. Neostigmine
3. Demecarium
4. **Echothiophate**

270. Choose the correct answer regarding the indication of anticholinesterase agent neostigmine:
1. Glaucoma
2. **Myasthemia gravis**
3. Diagnostic testing with suspected myasthenia gravis (tension test)
4. Tachycardia

271. Choose the anticholinesterase agent used for diagnostic testing of myasthemia gravis:
1. Physostigmine
2. **Edrophonium**
3. Echothiophate
4. Pyridostigmine

272. Choose the muscarinic effects of anticholinesterase drugs:
1. Stimulation of neuromuscular transmission
2. Muscle fasciculation
3. Muscle paralysis with higher doses
4. **Increased salivation.**

273. Choose the nicotinic effects of anticholinesterase drugs:
1. Myosis
2. Abdominal pain
3. **Neuromuscular transmission stimulation**
4. Hypotension

274. The following anticholinesterases are agricultural insecticides:
1. **Malathion**
2. Neostigmine
3. Echothiophate
4. Pyridostigminie

275. Which is the main indication for echothiophate (anticholinesterase agent)?
1. Myasthenia gravis
2. Atonic bladder
3. **Glaucoma**
4. Atonic bowel

276. Which anticholinesterase agent can be used for the treatment of atonic bowel?
1. Physostigmine
2. Edrophonium
3. Echothiophate
4. **Neostigmine**

277. Myasthenia gravis can be treated with:
1. **Pyridostigmine**

2. Physostigmine
3. Edrophonium
4. Echothiophate

278. Which symptoms express cholinergic crisis?
1. Decreased bronchial, salivary and sweat gland secretion
2. Bronchodilation and hypertension
3. Mydriasis
4. **Nausea, vomiting, diarrhea, muscle cramps and fasciculation.**

279. Treatment of acute overdosage with long-acting anticholinesterase includes:
1. **Pralidoxime**
2. Parathion
3. Edrophonium
4. Methacholine

280. Which anticholinesterase drug is used as antidote for tubocurarine (skeletal muscle relaxant)?
1. Echothiophate
2. Edrophonium
3. **Neostigmine**
4. Physostigmine

281. The M_1 muscarinic cholinoceptors binding sites for competitive antagonists are located in the following organs:
1. Skeletal muscles
2. Vascular smooth muscles and various glands
3. **Cerebral cortex**
4. Cardiac muscle

282. The M_2 muscarinic cholinoceptors binding sites for competitive antagonists are identified in:
1. **Cardiac muscle**
2. Vascular smooth muscle
3. Skeletal muscle
4. Carotid-sino-aortic zone

283. M_3 muscarinic cholinoceptors as binding sites for competitive antagonists are localized in:
1. Cardiac muscle
2. Skeletal muscles
3. **Vascular smooth muscles and various glands**
4. Adrenal medulla

284. Which antagonist of M-muscarinic cholinoceptors readily crosses the blood-brain barrier?
1. **Scopolamine**
2. Propantheline
3. Glycopyrrolate
4. Ipratropium

285. Choose the M-muscarinic cholinoceptors antagonist drug with tertiary amine structure:
1. **Benztropin**
2. Ipratropium
3. Glycopyrrolate
4. Propantheline

286. The following M-muscarinic cholinoceptors antagonists belong to quaternary amines:
1. Tropicamide
2. Scopolamine
3. Atropine
4. **Ipratropium**

287. Choose the M-muscarinic cholinoceptors antagonists for gastrointestinal application:
1. **Pirenzepine**
2. Ipratropium
3. Benztropin
4. Tropicamide

288. Choose the M-muscarinic cholinoceptors antagonist for application in ophthalmology:
1. Benztropin
2. Ipratropium
3. **Tropicamide**
4. Dicyclomine

289. Choose the M-muscarinic cholinoceptors antagonist for neurologic application:
1. Pirenzepine
2. Propantheline
3. Tropicamide
4. **Benztropin**

290. Which antimuscarinic drug is effective for the treatment of bronchial asthma?
1. Tropicamide
2. Pirenzepine
3. **Ipratropum**
4. Scopolamine

291. Which antimuscarinic drug in needed doses usually has minimal stimulant effect, especially on the parasympathetic medullary centers, which is followed by longer-lasting sedative effect on the brain?
1. Ipratropium
2. Tropicamide
3. **Atoropine**
4. Pirenzepine

292. Which antimuscarinic drug is used for urinary disorders (overactive bladder)?
1. Scopolamine
2. Pirenzepine
3. **Oxybutynine**
4. Tropicamide

293. Antimuscarinic drugs – darifenacin, solifenacin and tolterodine are especially effective for the application in:
1. Ophthalmology.
2. Gastroenterology.
3. Cardiology.
4. **Urology.**

294. The most sensitive organs for the atropine action are:

1. **Salivary glands**
2. Heart
3. Eye
4. Gastrointestinal tract

295. Atropine action on eyes includes:
1. Myosis
2. **Cycloplegia**
3. Decreased intraocular pressure
4. Accomodation spasm

296. Atropine is contraindicated in cases of:
1. **Severe tachycardia**
2. Poisoning with anticholinesterases
3. gastrointestinal spasm
4. bronchial asthma

297. Indications for the atropine use are:
1. Glaucoma
2. Cardiac Supraventricular tachycardia
3. Ileus
4. **Preopparatively for sedation and the bronchial tree drying.**

298. Choose the wrong answer regarding the atropine use:
1. Symptomatic bradycardia and AV conduction block
2. Acute poisoning with anticholonesterases.
3. **Prostatic adenoma**
4. Intraocularly – dilates pupils for retinal examination.

299. Side effects of muscarinic receptors blockade include:
1. Diarrhea
2. Bradycardia
3. **Constipation**
4. Hypotension

300. Over-dosage with muscarinic antagonists (e.g. atropine) produce:
1. **Delirium**
2. Severe salivation
3. Hyperhidrosis
4. AV conduction block

301. The statements "dry as a bone, blind as bat, red as a beet, mad as hatter" characterize overdosage of antimuscarinic drug:
1. Tropicamide
2. pirenzepine
3. Glycopyrrolate
4. **Atropine**

Anti-nicotinic agents (ganglionic blocking agents)

302. Ganglionic blocking agents mostly block the actions of acetylcholine by blocking the nicotinic receptors in:
1. Only parasympathetic ganglia

2. Only sympathetic ganglia
3. **Both ganglia**
4. Skeletal muscles

303. The short-acting ganglia blocker is:
1. **Trimetaphan**
2. Hexamethonium
3. Mecamylamine
4. Pentolinium

304. Ganglionic blocking agents effects due to inhibition mostly parasympathetic tone include:
1. **Tachycardia**
2. Diarrhea
3. Micturition
4. Salivation

305. Ganglionic blocking agents effects due to inhibition mostly sympathetic tone include:
1. **Hypotension**
2. Hidrosis (sweat glands)
3. Dry mouth
4. Constipation

306. Ganglionic blocking agent trimetaphan is used for the several states, except for:
1. Hypertensive crises with acute dissecting aortic aneurysm
2. Autonomic hyperreflexion following the spinal cord injury.
3. Controlled hypotension
4. **Constipation.**

307. Side effects of ganglionic blocking agents (mecamylamine) due to parasympathetic blockade include:
1. **Constipation, paralytic ileus**
2. Hypertension
3. Impotence
4. Syncope.

308. Side effects of ganglionic blocking agents due to sympathetic blockade include:
1. **Orthostatic hypotension**
2. Constipation
3. Blurred vision
4. Urinary retention.

Neuromuscular blocking agents (skeletal muscle relaxants)

309. Choose the correct answer related to skeletal muscle relaxants:
1. They are not structurally related to acetylcholine.
2. They readily penetrate blood-brain barrier.
3. They contain tertiary nitrogen
4. **They are safe to use in general anesthesia for caesarean section.**

310. Skeletal muscle relaxants:
1. Are lipophilic agents.
2. **Contain quaternary nitrogen.**

3. Sensitivity to them of muscle groups is characterized by ascending order – diaphragm, abdomen, intercostals, jaw and eyelids.
4. Antibiotics (aminoglycosides) may decrease potency of skeletal muscle relaxants.

311. Choose the depolarizing blockers that bind to skeletal muscles nicotinic receptors and cause depolarization (agonists).
1. Tubocurarine
2. Pancuronium
3. Vecuronium
4. **Succinylcholine.**

312. The following skeletal muscle relaxants are non-depolarizing blockers, except for:
1. Atracurium
2. Vecuronium
3. **Succinylcholine**
4. Pancuronium

313. Which of the skeletal muscle relaxants do not prevent depolarization:
1. **Succinylcholine**
2. Tubocurarine
3. Pancuronium
4. Vecuronium

314. Non-depolarizing skeletal muscle relaxants:
1. **Do not produce muscle fasciculation.**
2. Their actions are increased by anticholinesterase.
3. Their actions are decreased by diethyl ether and halogenated general anesthetics.
4. Are contraindicated as adjunct in surgical anesthesia and in patients with severe respiratory failure on mechanical ventilation.

315. Which skeletal muscle relaxant has 2 phase of action?
1. Pancuronium
2. Atracurinum
3. **Succinylcholine**
4. Rocuronium

316. Choose the wrong answer related to the skeletal muscle relaxants:
1. Phase I (depolarising) block prolonged binding to receptor produces persistent depolarization, thus making membrane unresponsive to new impulses.
2. Phase II (Desensitation block) membrane becomes repolarized but is unresponsive to new impulses;
3. **Succinylcholine has the most prolonged action.**
4. Tubocurarine action is diminished by anticholinesterase agents.

317. Which of the skeletal muscle relaxants may induce histamine release, bronchospasm and hypotension (due to blockade of nicotinic receptors in autonomic gangli1.?
1. Vecuronium
2. Pancuronium
3. Atracurium
4. **Tubocurarine**

318. Which of the skeletal muscle relaxants has vagolytic effect (by blocking cardiac M2-muscarinic receptors leading to tachycardi1.?

1. Tubocurarine
2. Atracurium
3. **Pancuronium**
4. Vecuronium

319. Which of the following skeletal muscle relaxants is a drug of choice for patients having renal or hepatic failure?
1. Succinylcholine
2. **Atracurium**
3. Pancuronium
4. Vecuronium

320. Which of the skeletal muscle relaxants are metabolized by ester hydrolysis and Hoffman reaction (independently of renal and hepatic function)?
1. **Atracurium**
2. Rocuronium
3. Pancuronium
4. Vecuronium

321. The effect of non-depolarizing skeletal muscle relaxants may be reverse by:
1. Atropin
2. **Anticholinesterase agents**
3. Cholinesterase reactivators
4. Epinephrine

322. Choose the correct answer concerning syccinylcholine:
1. Has long-duration of action
2. Muscles paralysis within the first minute
3. **Persistent depolarization of neuro-muscular junction (phase I)**
4. Anticholinesterases diminish phase I blockade.

323. Choose the wrong answer related to skeletal muscle relaxant syccinylcholine:
1. Anticholinesterases enhance phase I blockade and antagonize phase II.
2. It is broken down by plasma cholinesterase (pseudocholinesterase).
3. Rapid onset and short duration of action (5-10 minutes).
4. **Its action is not associated with genetic polymorphism**.

324. The side effects of non-depolarizing skeletal muscle relaxants include:
1. **Respiratory depression and apnea**
2. Dry mouth
3. Bradycardia
4. Hypertension

325. Malignant hyperthermia in genetically susceptible patients occurs more frequently when the following skeletal muscle relaxants are given along with halothane (general anesthetic):
1. Tubocurarine
2. Pancuronium
3. Atracurium
4. **Succinylcholine**

326. Which of muscle relaxants after administration in burn or stroke patients may result in potentially fatal hyperkalemia (due to vigorous muscle contraction/depolarization):

1. Pancuronium
2. Atracurium
3. **Succinylcholine**
4. Vecuronium

327. Which of muscle relaxants is contraindicated for patients having open eye injuries, as tonic extra-ocular muscle contractions raise the intraocular pressure?
1. Vecuronium
2. Rocuronium
3. **Succinylcholine**
4. Atracurium

328. Cardiac arrhythmias can occur (due to muscarinic activity) by the action of the following skeletal muscle relaxants:
1. Tubocurarine
2. Pancuronium
3. Rocuronium
4. **Succinylcholine**

329. Choose the isoquinoline derivative skeletal muscle relaxant:
1. **Atracurium**
2. Pipecuronium
3. Rocuronium
4. Vecuronium

330. Choose the steroid derivative skeletal muscle relaxant:
1. **Vecuronium**
2. Tubocurarine
3. Atracurium
4. Doxacurium

331. Which of the skeletal muscle relaxants originally called diacetylcholine is simply two molecules of acetylcholine linked through the acetate methyl groups:
1. Tubocurarine
2. Atracurium
3. Vecuronium
4. **Succinylcholine**

332. Which of the following skeletal muscle relaxants predominantly undergo to hepatic metabolism?
1. Tubocurarine
2. **Vecuronium**
3. Doxacurium
4. Succinylcholine

333. Which of the following skeletal muscle relaxants predominantly are excreted by the kidney?
1. **Tubocurarine**
2. Vecuronium
3. Atracurium
4. Vecuronium

Histamine, serotonin and the ergot alkaloids

334. . Histamine (H_1) receptors are located in:

a) Smooth muscle, endothelium and brain;

b) Gastric musoca, cardiac muscle, mast cells;

c) Myenteric plexus;

d) CD4 T cells.

335. Which histamine receptors have presynaptic localization?

a) H_1;

b) H_2;

c) H_3;

d) H_4

336. Eosinophils and neutrophils contain the following histamine receptors:

a) H_1;

b) H_2;

c) H_3;

d) H_4

337. The postreceptor mechanism of H_1-histamine receptor stimulation includes:

a) Gq protein activation and increasing of IP_3, DAG;

b) Cs protein activation and increasing of cAMP;

c) Gi protein activation and decreasing of cAMP;

d) Gq protein activation and increasing of cAMP

338. Which of the following drugs have a lower sedative potential?

a) Cyclizine;

b) Hydroxyzine;

c) Fexofenadine;

d) Doxylamin

339. A 53 year-old ship's captain complains of seasonal allergies. Which one of the following would be indicated?

a) Promethazine;

b) Dimenhydrinate;

c) Fexofenadine;

d) Hydroxyzine

340. Which of the following statements concerning H_1 antihistamines is correct?

a) Second generation H_1 antihistamines are relatively free of advers effects

b) The motor coordination involved in driving an automobile is not affected by the use of first generation H_1 antihistamines;

c) Both first- and second generation H_1 antihistamines readily penetrate the blood-brain barrier;

d) Because of the established long-term safety of first-generation H_1 antihistamines, they are the first choice for initial therapy.

341. Which one of the following drugs could significantly impair the ability to drive an automobile?
a) Diphenhydramine;
b) Fexofenadine;
c) Cetirizine;
d) Loratadine

342. Second generation H_1 antihistamines are:
a) Diphenhydramine;
b) Hydroxyzine;
c) Cyclizine;
d) Loratadine.

343. First-generation H_1 antihistamines includes:
a) Fexofenadine;
b) Cetirizine;
c) Dimenhydrinate;
d) Loratadine

344. Which one of the following antihistamines are produced α-adrenoceptor blocking effects?
a) Loratadine;
b) Cetirizine;
c) Promethazine;
d) Cyclizine

345. Which one of the following antihistamines are produced anticholinergic activity?
a) Diphenhydramine;
b) Fexofenadine;
c) Loratadine;
d) Cetirizine

346. Second generation antihistamines are using in:
a) Sleep aid;
b) Motion sickness;
c) Nausea of chemotherapy;
d) Allergy

347. First generation (older) antihistamines are used in the treatment of following condition, except:
a) Allergy;
b) Sleep aid;
c) Motion sickness;
d) Arterial hypertension

348. Histamine is synthesized from:

a) L-histidine;
b) L-tryptophan;
c) Melatonin;
d) Tyrosine

349. Strong blocking effects at serotonin receptors have been demonstrated for the following antihistamines:
a) Loratadine;
b) Cetirizine;
c) Fexofenadine;
d) Cyproheptadine

350. Which H_1-antihistamine drug can be used in "serotonin syndrome" therapy:
a) Cyproheptadine;
b) Loratadine;
c) Cyclizine;
d) Cetirizine

351. Which antihistamine drugs have negligible CNS and ANS effects?
a) Diphenhydramine;
b) Promethazine;
c) Dimenhydrinate;
d) Cetirizine

352. Which serotonin receptors mediate nausea and vomiting?
a) 5-HT_{1D};
b) 5-HT_2;
c) 5-HT_3;
d) 5-HT_4

353. The following serotonin receptors are located in chemoreceptors:
a) 5-HT_{1D};
b) 5-HT_2;
c) 5-HT_3;
d) 5-HT_4

354. Which serotonin receptor mediates increased gastrointestinal motility?
a) 5-HT_{1D};
b) 5-HT_2;
c) 5-HT_3;
d) 5-HT_4

355. Which serotonin receptor is coupled with ion channel?
a) 5-HT_{1D};
b) 5-HT_2;

c) 5-HT_3;
d) 5-HT_4

356. Stimulation of 5-HT_2 (A, B, C) serotonin receptors mediate:
a) Increased IP_3;
b) Increased cAMP;
c) Decreased cAMP;
d) Open of Na^+-K^+ ion channel

357. Stimulation of 5-HT_4 serotonin receptor mediates:
a) Increase cAMP;
b) Decrease cAMP;
c) Activation of Gi protein;
d) Increase IP_3

358. Serotonin 5-$HT_{1D/1B}$ receptor agonist are used in the treatment of:
a) Migraine;
b) Serotonin syndrome;
c) Smooth muscle manifestation of carcinoid tumor;
d) Cold-induced urticaria

359. Antimigraine drugs include the following agents, except:
a) Sumatriptan;
b) Eletriptan;
c) Zolmitriptan;
d) Cyproheptadine

360. Serotonin 5-HT_2 receptor blocking agents include:
a) Cyproheptadine;
b) Ondansetron;
c) Sumatriptan;
d) Granisetron

361. Which drug is the prototypical 5-HT_3 serotonin receptor antagonist?
a) Cyproheptadine;
b) Ondansetron;
c) Phenoxybenzamine;
d) Ketanserin

362. The 5-HT_3 serotonin receptor antagonists are used in the prevention of:
a) Migraine attacks;
b) Nausea and vomiting associated with cancer chemotherapy;
c) Serotonin syndrome;
d) Malignant hyperthermia

363. Which irreversible α-adrenoceptor blocking agent has a long-lasting blocking action at 5-HT_2 receptors?

a) Ondansetron;

b) Phenoxybenzamine;

c) Sumatriptan;

d) Ritanserin

364. The following statements are correct:

a) The ergot alkaloids are irreversible antagonists at 5-HT_2, α-adrenoceptors and dopamine receptors;

b) Naturally occuring ergot alkaloids include ergotamine and ergonovine, which are used to treat migraine headache and as an oxytocic respectively;

c) Semisynthetic ergots include bromocriptine, with powerful hallucinogenic effects;

d) Lysergic acid diethylamide (LSD) is a semisynthetic ergot derivative used in hyperprolactinemia

365. Dihydroergotamine:

a) Causes vasodilation;

b) Exerts its actions by binding to specific ergotamine receptors;

c) Is useful in treating acute migraine headaches;

d) Is useful for maintaining uterine muscle tone during pregnancy

366. The powerful hallucinogenic effects are produced by following ergot alkalois:

a) Ergonovine;

b) Lysergic acid diethylamide (LSD);

c) Bromocriptine;

d) Cabergoline

367. The following ergot alkaloids exert the high affinity for dopamine receptors:

a) Bromocriptine;

b) Ergonovine;

c) Ergotamine;

d) Dihydroergotamine

368. Which ergot derivates are highly specific for migraine pain?

a) Cabergoline;

b) Ergotamine;

c) Pergolide;

d) Bromocriptine

369. The following statements are correct:

a) In most patients the ergot alkaloids have significant effect on bronchiolar or urinary smooth muscle;

b) The ergot alkaloids can induced nausea, vomiting, and diarrhea even in low doses in some patients;

c) The gastrointestinal tract is less sensitive to ergot alkaloids;

d) The ergot alkaloids should be given before delivery

370. Choose a correct answer:

a) The ergot derivatives should be used only for control of late uterine bleeding (postpartum hemorrhage);
b) Ergotamine and ergonovine caused prolonged vasodilation;
c) Semisynthetic ergots bromocriptine and pergolide are contraindicated in parkinsonism;
d) Dihydroergotamine is contraindicated for treatment of intractable migraine.

371. Choose a correct answer:
a) Using of ergot alkaloids may result in gangrene and require amputation;
b) The most rare toxic effects of the ergot derivatives are gastrointestinal disturbances;
c) The peripheral vascular vasodpasm caused by ergot is always refractory to nitroprusside or nitroglycerin;
d) Ergonovine given intravenously produces prompt vasodilation during coronary angiography

The Eicosanoids, Prostaglandins, Thromboxanes, Leukotrienes and related drugs

372. The following statements are correct:
a) The prostaglandins, thromboxane and prostacyclin, collectively termed the prostanoids;
b) Prostaglandins are produced by the enzyme 5-Lipoxygenase;
c) $PGF_{2\alpha}$ causes bronchodilation and myometrial relaxation;
d) PGD_2 increases platelet aggregation

373. Choose a correct answer:
a) COX-2 (Cyclooxygenase)is present in tissues in which prostaglandins are useful (eg, the stomach, where prostaglandins protect the mucosa against acid.
b) COX-1 appears to be more important in mediating pathophysiologic processes, especially joint inflammation;
c) The metabolism of arachidonic acid by the 5-12, and 15-lipoxygenases results in the production of hydroperoxyeicosatetraenoic acids (HPETEs), which rapidly convert to hydroxy derivatives (HETEs) and leukotrienes;
d) Prostaglandin D_2 (PGD_2) is vasoconstrictor agent

374. The following agents are chemotaxins, except:
a) LTB_4 (leukotriene-B_4);
b) PAF (Platelet-activating factor);
c) 12-HETE(Hydroxyeicosatetraenoic acid);
d) LTC_4 (Leukotriene-C_4).

375. The cysteinyl-leukotrienes include:
a) LTA_4, LTB_4, LTD_4;
b) LTC_4, LTD_4, LTE_4;
c) LTB_4, LTD_4, LTE_4;
d) LTA_4, LTC_4

376. The bronchoconstrictor agents are:
a) PGI_2 (prostaglandin);
b) PGD_2;

c) PGE_2;
d) LTD_4 (leukotriene)

377. Vasodilating agents include:
a) TXA_2;
b) PGI_2
c) $PGF_{2\alpha}$
d) Isoprostanes

378. The cysteinyl leukotrienes cause:
a) Vasoconstriction in most vessels, but coronary vasodilation;
b) Decrease vascular permieability;
c) Coronary vasoconstriction;
d) Bronchodilation

379. Choose a correct answer:
a) 5-Lipoxygenase acts on arachidonate to give 12-HPETE (Hydroxyperoxyeicosa tetraenoic acid), which is converted to leukotriene LTA_4;
b) LTA_4 can be converted only to cysteinyl-leukotrienes (LTC_4, LTD_4 and LTE_4);
c) LTB_4 is can important mediator in all types of inflammation;
d) Cysteinyl-leukotrienes are less important in bronchial asthma.

380. Vasodilator prostaglandins – PGI_2 and PGE_2 promote vasodilation via the:
a) IP and EP_4 receptors;
b) EP_3 receptors;
c) FP receptors;
d) TP receptors

381. $PGF_{2\alpha}$ causes:
a) Bronchoconstriction;
b) Myometrial relaxation;
c) Vasodilation;
d) Decreased aqueous humor drainage in glaucoma

382. PGD_2 via the DP_1 receptors causes:
a) Vasoconstriction;
b) Inhibition of platelet aggregation;
c) Hyperalgesia;
d) Increased aqueous humor drainage in glaucoma

383. PGE_1 analogs:
a) Increased bicarbonate and mucus secretion in stomach;
b) Cause gastric ulcer;
c) Have analgesic effects;
d) Facilitate platelet aggregation

384. Misoprostol is a analog of:

a) PGI_2;

b) PGE_1;

c) $PGF_{2\alpha}$;

d) PGD_2

385. Latanoprost is a analog of:

a) PGE_1;

b) PGE_2;

c) $PGF_{2\alpha}$;

d) PGI_2

386. Dinoprostone is a synthetic peparation of:

a) $PGF_{2\alpha}$;

b) PGE_2;

c) PGI_2;

d) PGE_1

387. Dinoprostone is used:

a) As oxytocic;

b) For prevention of NSAID-induced ulcers;

c) In glaucoma;

d) In severe pulmonary hypertenzion

388. Epoprostenol is used:

a) For severe pulmonary hypertension;

b) In chronic glaucoma;

c) For prevention of NSAID-induced ulcers;

d) As oxytocic.

389. Epoprostenol, iloprost and treprostinil are the analogs of:

a) $PGF_{2\alpha}$;

b) PGI_2;

c) PGD_2;

d) PGE_1

390. Which drugs are used for prevention of NSAID – induced ulcers:

a) Latanoprost;

b) Misoprostol;

c) Carboprost;

d) Alprostadil

391. Which drug is used to induced second-trimester abortions and to control postpartum hemorrhage that is not responding to conventional methods of management:

a)Carboprost;
b) Alprostadil;
c) Iloprost;
d) Epoprostenol

392. Alprostadil is used:
a) In eretill dysfunction;
b) In chronic glaucoma;
c) For prevention of NSAID-induced ulcers;
d) In severe pulmonary hypertesion

393. Which prostanoid receptors stimulation activate adenylyl cyclase via Gs protein?
a) EP_3;
b) TP;
c) FP;
d) IP

394. "Contractile" prostanoid receptors which activation leading to the formation of inositol triphosphate (IP_3), with subsequent mobilization of Ca^{2+} stores and increase of free intracellular Ca^{2+}:
a) IP, EP_2;
b) EP_2, EP_4;
c) TP, FP, EP_1;
d) DP_1, IP

395. The term "prostanoids" encompasses the:
a) Prostaglandins and thromboxanes;
b) Thromboxanes and leukotrienes;
c) Leukotrienes and platelet-activating factor;
d) Prostaglandins and platelet-activating factor

Anti-inflammatory drugs

396. Anti-inflammatory nonsteroidal drugs include the following agents, except:
a) Diclofenac;
b) Naproxen;
c) Piroxicam;
d) Allopurinol

397. The selective cyclooxygenase-2 (COX-2) inhibitors:
a) Cyclosporine;

b) Celecoxib;
c) Azathioprine;
d) Iburprofen

398. Propionic acid derivative NSAIDs:
a) Indomethacin;
b) Iburpofen;
c) Phenylbutazone;
d) Piroxicam

399. Pyrazolone derivative NSAIDs:
a) Phenylbutazone;
b) Indometacin;
c) Meloxicam;
d) Paracetamol

400. Indole derivative NSAIDs:
a) Flurbiprofen;
b) Indometacin;
c) Diclofenac;
d) Piroxicam

401. Phenylacetic acid derivative:
a) Diclofenac;
b) Naproxen;
c) Meloxicam;
d) Ibuprofen

402. In which one of the following conditions would aspirin be contraindicated?
a) Myalgia;
b) Fever;
c) Peptic ulcer;
d) Unstable angina

403. Which of the following statements concerning COX-2 nhibitors is correct?
a) The COX-2 (cyclooxygenase-2) inhibitors show greater analgesic activity than traditional NSAID-s;
b) The COX-2 inhibitors decrease platelet function;
c) The COX-2 inhibitors do not affect the kidney;
d) The COX-2 inhibitors show anti-inflammatory activity similar to that of the traditional NSAID-s.

404. An 8 year-old girl has a fever and muscle aches from a presumptive viral infection. Which one of the following drugs would be most appropriate to treat her symptoms?
a) Paracetamol;
b) Aspirin;

c) Celecoxib;
d) Indomethacin

405. A 70 year-old man has a history of ulcer disease. He has recently experienced swelling and pain in the joints of his hads. His physician wants to begin therapy with an NSAID-s. Which one of the following drugs might also be prescribed along with the NSAID to reduce the risk of activaing this patient's ulcer disease?

a) Allopurinol;
b) Colchicine;
c) Misoprostol;
d) Probenecid

406. Which one of the following drugs have the greatest half-life ($T^1/_2$)?

a) Diclofenac;
b) Ibuprofen;
c) Indometacin;
d) Piroxicam

407. Which drug irreversibly blocks cyclooxygenase, especially in platelets:

a) Celecoxib;
b) Aspirin;
c) Iburpofen;
d) Diclofenac

408. The following statements are correct:

a) The anti-inflammatory and analgesic action of aspirin is longer than its antiplatelet effect;
b) The NSAID-s are well absorbed after oral administration. Most are excreted via the kidney;
c) Paracetamol has greater anti-inflammatory action than other NSAID-s;
d) In overdosage, metabolites of paracetamol can mainly cause kidneys damage

409. The following statements are correct:

a) Paracetamol is a very weak COX (cyclooxygenase) inhibitor and has little or no anti-inflammatory action;
b) At high doses, aspirin is a very effective antiplatelet agent;
c) Most of NSAID-s are less effective against the pain in dysmenorrhea;
d) NSAID-s are not used for acute joint pain

410. Which of drugs have a lower risk of gastrointestinal bleeding but is associated with an increased risk of cardiovascular events (myocardial infarction and stroke)?

a) Non-COX-selective NSAIDs;
b) The selective COX-2 inhibitors;
c) Paracetamol;
d) Leukotrienes antagonists

411. Which drug at low doses is a very effective antiplatelet agent and widely used to reduce the risk of myocardial infarction and stroke:

a) Allopurinol;
b) Aspirin;
c) Paracetamol;
d) Celecoxib

412. Which drug in children with viral infections has been associated with an increased risk of Reye's syndrome?
a) Iburpofen;
b) Flurbiprofen;
c) Aspirin;
d) Celecoxib

413. Diversion of arachidonic acid metabolism to the leukotriene pathway may rarely present with the clinical picture of:
a) An allergic response to aspirin, including anaphylaxia;
b) Toxicities of NSAIDs include gastrointestinal upset;
c) Reye's syndrome;
d) Peptic ulcers with or without bleeding

414. Which of the following enzymes is the main target of glucocorticosteroids:
a) Cyclooxygenases (COX-1 and-2);
b) 5-Lipoxygenase;
c) Phospholipase A_2;
d) Xanthine oxidase

415. The precursor of prostaglandins and leukotrienes is:
a) Glutamic acid;
b) Citric acid;
c) Arachidonic acid;
d) Acetylsalycilic acid

416. Choose a side effect which is not caused by aspirin:
a) Increased in blood pH;
b) Gastric ulceration;
c) Tinnitus;
d) Hyperventilation

417. Arachidonic acid is metabolized by two main pathways: cyclooxygenase and lipoxygenase. Which of the following is a main end-product of the lipoxygenase pathway?
a) Prostaglandins;
b) Prostacyclin (PGI_2);
c) Leukotrienes;
d) Thromboxanes

418. In an overdose situation, the elimination of aspirin follows zero-order kinetics. This means that:

a) No drug appears in the urine;

b) The metabolism rate of aspirine is zero;

c) Elimination rate is directly proportional to plasma concentration;

d) Plasma concentrations decrease linearly with time

419. A child takes what comes close to being a lethal dose of paracetamol. Which of the following is the most likely pathology involved in this drug overdose?

a) Acute nephropathy;

b) A-V conduction disturbances, heart block;

c) Liver failure;

d) Status asthmaticus

420. A patient has been taking doses of aspirin that are too high for several weeks. Low-grade aspirin toxicity (salicylism) develops. Which of the following signs of symptoms would be most indicative of the salicylism and the high salicylate levels:

a) Constipation;

b) Cough;

c) Hypertension;

d) Tinnitus

421. Which of the following property combinations is peculiar to the majority of NSAIDs?

a) Antihistaminic, antipyretic, Analgesic;

b) Immunodepressive, anti-inflammatory, analgesic;

c) Antipyretic, Analgesic, Anti-inflammatory;

d) Anti-inflammatory, immunodepressive, antihistaminic

422. Side effects of indometacin include the following:

a) Abdominal pain diarrhea, gastrointestinal hemorrhage and pancreatitis;

b) Dizziness, confusin and depression;

c) Trombocytopenia;

d) All of the above

423. Indication for aspirin administration in the following, except:

a) Inflammatory conditions;

b) Decreasing the incidence of transient ischemic attack, unstable angina, coronary arteryd thrombosis with myocardial infarction and thrombosis after coronary artery bypass grafting;

c) Relieving severe visceral pain, e.g. myocardial infarction, cancer pain condition, renal or biliary colic;

d) Reducing elevated body temperature

424. NSAIDs are effective in the treatment of pain in:

a) Acute abdomen;

b) Bone cancer;

c) Renal colic;

d) Myocardial infarction

425. Disease modifying antirheumatic drugs include the following agents, except:
a) Abatacept;
b) Azathioprine;
c) Cyclophosphamide;
d) Probenecid

426. Which one of the following drugs is monoclonal antiboody?
a) Rituximab;
b) Sulfasalazine;
c) Methotrexate;
d) Allopurinol

427. TNF (tumor necrosis factor)-α blocking agent:
a) Rituximab;
b) Infliximab;
c) Colchicine;
d) Phenylbutazone

428. TNF-α (tumor necrosis factor) blocking agents are used in the treatment of following diseases, except:
a) Crohn's disease;
b) Ankylosing spondylitis;
c) Gout;
d) Psoriatic arthritis

429. Which drug does not use in the treatment of gout?
a) Indometacin;
b) Colchicine;
c) Naproxen;
d) Paracetamol

430. Which drug inhibits xanthine oxidase activity and is used in patients with recurrent attacks of gout?
a) Indometacin;
b) Aspirin;
c) Allopurinol;
d) Probenecid

431. Uricosuric drugs are:
a) Sulfinpyrazone;
b) Cochicine;
c) Alloperidol;
d) Aspirin

432. Which drug raises plasma urate levels at low doses by inhibiting uric acid secretion in the renal tubules and is contraindicated in acute attacks of gout?

a) Indometacin;

b) Naproxen;

c) Aspirin;

d) Diclofenac

433. Which drug binds to tubulin in leucocytes and prevents its polymerization into microtubules?

a) Naproxen;

b) Colchicine;

c) Sylfipyrazone;

d) Indometacin

434. What is a common side effect of colchicine used to treat acute gout, especially when given orally:

a) Reye's syndrome;

b) Gi side effects;

c) Anemia;

d) GU side effects

435. The following statements are correct:

a) Prostaglandins produce little pain by themselves, but potentiate the pain caused by other mediators of inflammation(e.g. histamine, bradykinin).

b) NSAIDs reduce the normal body temperature or the elevated temperatures in heat stroke;

c) During fever, endogenesous pyrogen (interleukin-12) is released from leucocytes and acts directly on the thermoregulatory center in the hypothalamus to increase body temperature;

d) Paracetamol unlike NSAIDs in overdose may cause interstitial nephritis

436. The following statements are correct:

a) The glucocorticosteroids are examples of gene-active hormones;

b) The glucocorticosteroids are used for their immunostimulatory action;

c) The glucocorticosteroids directly inhibit phospholipase-A_2 enzyme;

d) The glucocorticosteroids suppress only the early phase of inflammation

437. Inflammation by glucocorticosteroids is suppressed by:

a) Increasing of circulating immunocompetent cells and macrophages;

b) Producing annexines and inhibit phospholipase A_2;

c) Increasing of formation of prostaglandins, leukotrienes and platelet activating factor;

d) Stimulating the genes encoding for COX-2, phospholipase-A_2 and interleukin-2.

Drugs used in asthma

438. The following statements are correct:

a) Steroids commonly used in asthma include beclomethasone, fluticasone and several others;

b) B_2 adrenoceptor selective agonist salmeterol is short acting drug;

c) Mast cell stabilizers include ipratropium;
d) Theophylline is a methylxanthine related to caffeine and theobromine, but is a less effective bronchodilator than either

439. B_2 adrenoceptor selective agonists:
a) Are the drugs of rare choice in acute episodes of asthmatic bronchoconstriction;
b) Salmeterol is a drug of choice in acute episodes of asthmatic bronchoconstriction;
c) Toxicities of β_2-adrenoceptor agonists include tremor and tachycardia, but it is important not to limit the amount of the drug during an acute attack because uncontrolled bronchoconstriction can be fatal;
d) β_2-adrenoceptor selective agonists act as physiologic antagonists against leukotrienes by increasing IP_3 in smooth muscle.

440. Antimuscarinic drugs:
a) Are available in metered-dose inhaler form and are as generally effective as the β_2-selective agonists;
b) Ipratropium is a tertiary amine and has marked central effects;
c) Tiotropium is a most short-acting agent among the atropinelike muscarinic antagonists;
d) Impratropium can produce less tachycardia to compare with atropine

441. Leukotriene receptor antagonists include:
a) Zafirlucast;
b) Zileuton;
c) Nedocromil;
d) Cromolin

442. Cysteinyl leukotrienes receptor antagonists:
a) Are orally active, an advantage for treatment of young children and others who cannot use inhalers;
b) Are as effective as corticosteroids and have a great value in acute bronchospasm;
c) Are acting on LTB_4 leukotriene receptors;
d) Are used only in adults

443. The mechanisms of action of theophylline include:
a) Beta-adrenoceptor stimulating activity;
b) Direct effects on intracellular calcium concentration;
c) Antagonism of adenosine receptors;
d) Muscarinic receptor antagonism

444. Zileuton mechanism of action:
a) Stimulates Beta-2 adrenoceptors;
b) Inhibits 5-lypoxygenase;
c) Blocks M_3-muscarinic receptors;
d) Inhibits phosphodiesterase

445. Theophylline mainly inhibits:
a) Phosphodiesterase-1;
b) Phosphodiesterase-2;

c) Phosphodiesterase-3;
d) Phosphodiesterase-4

446. Which of these groups of drugs is used for management of acute asthma?
a) Leukotriene receptor antagonists;
b) 5-LO inhibitors;
c) Cromolyn;
d) Corticosteroids

447. The standard treatment regimen for asthma is best described by which of the following:
a) Theophylline;
b) Inhaled Beta-2 adrenoceptors agonists only;
c) A combination of inhaled bronchodilators and inhaled corticosteroids;
d) Inhaled corticosteroids only

448. Symptoms typically produced by inhaled beta adrenoceptor agonists are:
a) Tachycardia, dizziness, nervousness;
b) Candidiasis and sore throat;
c) Nausea, agitation and convulsion;
d) Diarrhea, vomiting and nausea

449. Cromolyn is useful in many patients with asthma because it:
a) Inhibits cyclooxygenase-2;
b) Blocks adenosine receptors in bronchiolar smooth muscle;
c) Prevents antigen-induced degranulation of most cells;
d) Inhibits phosphodiesterase

450. A 23 year old women with asthma has what is described as "aspirin hypersensitivity" and experiences severe bronchospasm in response to even small doses of the drug. Which of the following is the most likely mechanism by which the aspirin provokes her pulmonary problems?
a) Blocks synthesis of endogenous prostaglandins that have bronchodilator activity;
b) Induces hypersensitivity of muscarinic receptors on airway smooth muscles;
c) Induces hypersensitivity of H_1-histamine receptors on airway smooth muscles;
d) Prevents or reduces epinephrine binding to B_2-adrenergic receptors (airways and elsewhere).

451. A-26 year old patient with asthma is being treated with zafirlucast. Which of the following in the main mechanism by which this drug works:
a) Blocks the proinflammatory effects of certain arachidonic acid metabolites;
b) Enhances release of epinephrine from the adrenal (suprarenal) medulla;
c) Increases airway β-adrenergic receptor responsiveness to endogenous norepinephrine;
d) Inhibits cAMP breakdown via phosphodiesterase inhibition

452. Corticosteroids in the treatment of asthma:
a) Relax smooth muscle;
b) Inhibit the inflammatory response;

c) Reduce patient responsiveness to beta-agonists;
d) Increase airway obstruction in acute asthma and therefore should only be used for chronic treatment.

453. Which drug group used to treat asthma causes oral candidiasis?
a) Leukotriene receptor antagonists;
b) Anti IgE antibodies;
c) Corticosteroids;
d) Beta-adrenoceptor agonists

454. Anti-IgE monoclonal antibodies used in the treatment of bronchial asthma:
a) Omalizumab;
b) Adalimumab;
c) Infliximab;
d) Etanersept

Hormons

455. Thyroid deficiency (hypothyroidism or myxedema) is treated by simple replacement therapy by using:
a) Liothyronine (T_3);
b) Propylthiouracil;
c) Methimazole;
d) Radioactive iodine (^{131}I).

456. Thyroid hormones act chiefly on:
a) Receptors associated with G-proteins;
b) Receptors associated with ion channels;
c) Receptors associated with thyrosinekinase activity;
d) Intracellular receptors that influence gene expression.

457. Choose right answers:
a) Triiodothyronine (T_3, Liothyronine) has a lower effect and longer action than Levothyroxine (T_4, Thyroxine);
b) Propylthiouracil and methimazole, both orally active, interfere with incorporation of iodine into thyroglobulin and possible block coupling of the monomers monoiodotyrosine and diiodotyrosine to form thyroxine and triiodothyronine;
c) Thioamids are T_3 and T_4;
d) Thioamides are the most important drugs for replacement therapy in thyroid deficiency.

458. The toxicity symptoms of prophylthiouracil and methimazole include the following, ecxept:
a) Rash;
b) Hypoprothrombinemia;
c) Hyperprothrombinemia;
d) Agranulocytosis.

459. Which drugs are used to destroy most or all of the gland in thyrotoxicosis:

a) ^{131}I;

b) Methimazole;

c) Propylthiouracil;

d) Levothyroxine

460. Iodides:

a) Stimulate the incorporation of iodine into the thyroglobulin molecule;

b) Inhibit the release of thyroxine from the gland;

c) Increase vascularity of hyperplastic gland;

d) Are contraindicated before thyroidectomy

461. Which drugs are contraindicated in thyroid storm?

a) Epinephrine;

b) Methimazole;

c) Propylthiouracil;

d) Hydrocortisone.

462. Choose right answers (Mechanism of action of radiocontrast media Ipodate and beta-blockers during thyroid storm):

a) Ipodate increases the release of thyroxine from the thyroid gland;

b) Ipodate blocks the conversion of thyroxine to triiodothyronine;

c) Beta-blockers (eg, propranolol) are contraindicated in the management of thyroid storm;

d) Beta-blockers stimulate the conversion of thyroxine into thiiodothyronine.

463. Glucocorticoids (Action on carbohydrates, proteins and lipids metabolism):

a) Increase gluconeogenesis;

b) Cause hypoglycemia;

c) Decrease catabolism;

d) Does'not have any influence on lipid metabolism.

464. Choose right answers (mechanism of action of Corticosteroids and Mineralocorticoids):

a) Corticosteroids bind to cytosolic receptors and the complexes formed undergo dimerization and then enter the cell nucleus;

b) Mineralocorticoids decrease Na^+ ions absorbtion in the renal collecting tubules;

c) Glucocorticosteroids activate some of the mechanisms involved in cell-mediated immunologic functions;

d) Glucocorticoids produced diuretic effect.

465. Which answer is not right?

Glucocorticoids (mechanism of action):

a) Alter gene expression by binding to tissue-specific nuclear response elements;

b) High doses result in decreased synthesis of prostaglandins and leukotrienes via inhibition of phospolipase A_2 ;

c) Decrease mRNA of COX-2, decreased platelet activating factor (PAF), and reduce synthesis of interleukin 2 (IL-2);

d) Cellular consequences include increased leukocyte migration, increased phagocytosis and lymphocyte proliferation and activation.

466. Pick out natural corticosteroids:

a) Cortisol;

b) Fludrocortisone;

c) Dexamethasone;

d) Prednisone

467. The major natural mineralocorticoid is:

a) Fludrocortisone;

b) Aldosterone;

c) Triamcinolone;

d) Prednisone

468. Corticosteroids are the following, except:

a) Prednisone;

b) Triamcinolone;

c) Dexamethasone;

d) Fludrocortisone

469. Choose right answer:

a) Cortisol has mineralocorticoid effects;

b) Natural corticosteroids haven't mineralocorticoid effects;

c) Synthetic corticosteroids have more mineralocorticoid effect than cortisol;

d) The half-life of cortisol in the circulation may be decreased in stress

470. Choose right answers:

a) Glucocorticoids and mineralocorticoids are used in Addison's disease;

b) Glucocorticoids are contraindicated in acute adrenal insufficiency states (infection, shock, and trauma);

c) Fludrocortisone decreases lipolysis.

d) Glucocorticoids cause hypoglycemia

471. Glucocorticoids metabolic effects include the following, except:

a) Wasting of muscle protein and lymphoid tissue;

b) Osteoporosis;

c) Growth inhibition;

d) Hypoglycemia.

472. Glucocorticoids are used to treat a wide range of disorders, except:

a) Inflammatory and immune disorders;

b) Bronchial asthma;

c) Cancer;
d) Heart failure;

473. Glucocorticoids are useful, except:
a) Gastric ulcer;
b) Collagen diseases;
c) Organ transplant rejection;
d) Rheumatoid arthritis and systemic lupus erythematosus.

474. Toxicities of glucocorticoids include the following conditions:
a) A Cushingoid state involves fat deposition and muscle atrophy;
b) Hypoglycemia and decreased insulin demand;
c) Increased skeletal growth in children;
d) Hypotension.

475. Drugs with mineralocorticoid activity may predominantly cause:
a) Osteoporosis;
b) Aseptic hip necrosis;
c) Electrolyte imbalance, edema and hypertension;
d) Hyperglycemia

476. Glucocorticoids may cause the following states, ecxept:
a) Gastrointestinal ulcers;
b) Decreased wound healing;
c) Glaucoma and cataract formation;
d) Decreased infections

477. Aldosterone receptor antagonists include:
a) Mifepristone;
b) Ketoconazol;
c) Spironolactone;
d) Metyrapone

478. A progestin receptor antagonist, which also blocks glucocorticoid receptors and has been used in Cushing's syndrome:
a) Metyrapone;
b) Ketoconazole;
c) Spironolactone;
d) Mifepristone

479. Drug which inhibits the steroid 11-hydroxylation and is used diagnostically in tests of adrenal function:
a) Ketoconazole;
b) Mifepristone;
c) Metyrapone;

d) Spironolactone

480. Choose right answers (properties of insulin):

a) Insulin is a polypeptide produced from proinsulin and released from pancreatic alfa cells by insulinogens including glucose;

b) The major targes for insulin are liver, muscle and adipose tissue;

c) Insulin decreased glycolysis;

d) Insulin increased glycogenolysis.

481. Insulin (Action on carbohydrates, proteins and lipids metabolism) :

a) Increased storage of glycogen;

b) Decreased synthesis of glycogen and protein;

c) Decreased triglyceride storage;

d) Increased lipolysis.

482. Insulin produces the following effects, except:

a) In liver increased glycogenesis;

b) In muscle increased glucose and protein;

c) In adipose tissue increased glucose uptake;

d) In adipose tissue increased lipolysis.

483. Insulin receptors in these tissues function as:

a) iones gated associated;

b) G-protein associated;

c) Transmembrane tyrosine kinases;

d) Intracellular that influence gene expression

484. Rapid-onset, short-acting forms of insulin used to control postprandial hyperglycemia include:

a) Regular zinc insulin;

b) Insulin glargine ;

c) NPH (Neutral protamine Hagedorn);

d) Insulin lente.

485. The longest-acting forms (>24 hours) of insulin include:

a) Insulin lispro;

b) Insulin glargin;

c) Insulin NPH (neutral protamine Hagedorn);

d) Insulin regular

486. Peak activity of rapid-acting forms of insulin is:

a) 1 hours;

b) 2-3 hours;

c) 5-8 hours;

d) 8-12 hours

487. Choose right answers:

a) Hypoglycemia from insulin overdosage may require parenteral beta-adrenoceptor blockers by intramuscular injection;

b) Patients with nephropathy are less susceptible to hypoglycemia;

c) Animal origin Insulin may cause systemic allergy which may result in severe rashes and possible anaphylaxis;

d) Diabetic ketoacidosis necessitated intravenous treatment with insulin Glargin.

488. Sulfonylureas oral hypoglycemic agents insclude:

a) Pioglitazone;

b) Rosiglitazone;

c) Repaglinide;

d) Chlorpropamide

489. Sulfonylureas oral hypoglycemic agents action mechanisms include:

a) Decrease postprandial blood glucose via inhibition of α-glucosidase in intestinal villi, which decreases the formation of absorbable carbohydrates;

b) Stimulate peroxisome proliferator-activated receptors;

c) Transcription of insulin-responsive genes, resulting in sensitization of target tissues to insulin;

d) Block ATP-gated K^+ channels in pancreatic beta cell membranes, resulting in the opening of voltage-regulated Ca^{2+} channels, of which influx elicit release of insulin from storage vesicles.

490. Newer Sulfonylureas drugs include the following agents, ecxept:

a) Glimepiride;

b) Glipizide;

c) Tolbutamide;

d) Glyburide.

491. Older Sulfonylureas include:

a) Glimepiride;

b) Glipizide;

c) Chlorpropamide;

d) Pioglitazone

492. Which sulfonylureas drugs can be displaced from plasma proteins by many drugs with enhancement of hypoglycemeic actions:

a) Glyburide.

b) Glimepiride;

c) Tolbutamide;

d) Glipiside

493. Sulfonylureas hypoglycemic agents:

a) Newer have duration 6 hours;

b) Are displaced from plasma proteins;

c) Are used in type-2 diabetes only as monotherapy;

d) Hypoglycemia and weight gain are common and rashes and other allergic reactions are rare.

494. Thiazolidinediones hypoglycemic drugs:
a) Repaglinide;
b) Rosiglitazone;
c) Metformin;
d) Tolbutamide

495. Thiazolidinediones mechanism of action:
a) Reduced postprandial and fasting glucose levels by decrease hepatic glucose production through activation of the enzyme AMP-activated protein kinase (AMPK);
b) Stimulate peroxisome proliferator-activated receptors (PPARS) involved in transcription of insulin-responsive genes, resulting in sensitization of target tissues to insulin;
c) Block K^+ channels in parcreatic beta cell membranes, resulting in the opening of voltage-regulated Ca^{++} channels and elicit release of insulin from storage vesicles
d) Decrease postprandial blood glucose via inhibition of α-glucosidases in intestinal villi, which decreases the formation of absorbable carbohydrates

496. Thiazolidinediones hypoglycemic drugs toxicity include the following, except:
a) Fluid retention;
b) Edema;
c) Weight gain;
d) Often hypoglycemia

497. Thiazolidinediones cannot be used:
a) In congestive heart failure and hepatic disease;
b) Hyperthyrodism;
c) Gastrointestinal ulcer;
d) Glaucoma

498. Biguanides include:
a) Metformin;
b) Acarbose;
c) Miglitol;
d) Glyburid

499. Choose right answers for biguanides:
a) Biguanides include Glyburid;
b) Always cause hypoglycemia;
c) They may cause lactic acidosis;
d) Gastrointestinal distress is not characteristic

500. Alpha-glucosidase inhibitors hypoglycemic agents are:
a) Miglitol;
b) Repaglinide;

c) Nateglinide;
d) Pioglitazone

501. Alpha-glycosidase inhibitors advers effects are:
a) Hypoglycemia;
b) Gastrointestinal stress;
c) Anemia;
d) Weight gain

502. Alpha-glycosidase inhibitors cannot use in:
a) Impaired renal and hepatic function;
b) Anemia;
c) Osteoporosis;
d) Obesity

Incretin-based drugs include:
a) Exenatide;
b) Pramlintide;
c) Pioglitazone;
d) Rosiglitazone

503. Incretin-based drugs mechanism of action:
a) Bind to GLP_1 (glucagon-like polypeptide) receptors;
b) Inhibit intestinal α-glycosidases;
c) Regulate gene expression by binding to PPAR-γ (peroxisome proliferator-activated receptor-gamm ;
d) Close K^+ channel in beta cells and increase insulin release.

504. Incretin-based drugs effects include the following, except:
a) Reduce post-meal glucose excursions;
b) Increase glucose-mediated insulin release;
c) Decrease appetite
d) Accelerate gastric emptying;

505. Exenatide toxicity include, except:
a) Nausea and vomiting;
b) Anorexia;
c) Weight gain;
d) Pancreatitis

506. Sitagliptin mechanism of action:
a) Binds to CLP-1 (Glucagon like polypeptide);
b) Inhibition of DPP-4 (dipeptidyl-peptidase-4) and blocks degradation of GLP-1;
c) Decreases circulating CLP-1 levels;
d) Binds to amylin receptors.

507. Sitagliptin effects are like:
a) Pioglitazone;
b) Acarbose;
c) Exenatide;
d) Repaglinide

508. Sitagliptin toxicity does not include:
a) Rinitis ;
b) Upper respiratory infections;
c) Rare allergic reactions;
d) Pancreatitis.

509. Amylin analog hypoglycemic agents include:
a) Sitagliptin;
b) Exenatide;
c) Pramlintide;
d) Nateglinide

510. Amylin analog mechanism of action:
a) Is like incretin-based drugs;
b) Binds to amylin receptors;
c) Blocks degradation of GLP-1;
d) Regulates gene expression by binding to PPAR-γ

511. Amylin analog effects are like:
a) Exenatide;
b) Rosiglitazone;
c) Miglitol;
d) Metformin

512. Amylin analog toxicity includes:
a) Hypoglycemia and headache;
b) Weight loss;
c) Upper respiratory infections;
d) Heart failure

513. Choose right answers (about Glucagon):
a) Glucagon is a peptide produced by pancreatic beta cells;
b) Activation of glucagon receptors results in an increase of cyclic AMP;
c) Glucagon decreases hepatic glycogenolysis and glyconeogenesis;
d) Glucagon leads to cardiac depression and relaxation of smooth muscle

514. Glucagon is used for:
a) Reversal of β-blocker overdosage;

b) Vasculature constriction;
c) Contraction of the bowel for x-ray visualisation;
d) Hypertonic crises